THE METAL INDUSTRY
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HANDICRAFT JEWELRY

By A. F. Saunders.

"The execution of a work of art is the realization of an aesthetic mental concept, through the aid of a material, a process, and a tool. But the very fact of choosing a material entails certain limitations, and the problem becomes one of selecting the method and the tools which will produce the best effect in the material, and, at the same time, respect its individuality."

Edouard M. Herjen.

In beginning this article on Handicraft Jewelry, I quote the above simple rule or principle for the reason of its important bearing upon the work of the metal craftsman, yet so often overlooked or misunderstood. Of all articles made in the precious and semi-precious metals, none expresses more the real individual taste of a person than the ornaments of personal wear called jewelry, yet how few really consider this when selecting such. The fabulous price of a gem, or the money, value per ounce of a precious metal, has really little more to do with the esthetic beauty of an object than has elaborate decorations to do with the real beauty of form.

1 2 3 4 5 6 7

HANDICRAFT JEWELRY.

In true craftsmen work the humblest of materials are sometimes used. A knowledge of the beauty possessed by the material employed, and how to show this to the best advantage, both by itself and in combination with other materials, reveals the art of the craftsman. During the past century and even at the present time, to a great extent, vulgar display rather than good workmanship founded on true principle and good taste, seems to influence style. This glittering show of precious gems savors more of the barbaric than of an age of cultured civilization. However, the comparative recent evolution in jewelry design (originating in England and France) has done much to arouse aesthetic feeling in the craftsman's work of to-day. For this, great credit is certainly due such artists as Lalaque, Wolfers, René, Foy and many other so-called secessionists; all working to arouse an appreciation of the real value and beauty of materials, however humble they may seem. More and more are we beginning to recognize the fact that beauty of material is superior to the demands of a subject.

We will use, for example, the simple design used as illustration for this article, each piece the work of a craftsman, every part done by hand alone. The color harmony of the different materials used, most carefully studied; also the gems were selected purely to carry out the color scheme, as a painter combines his colors, and to form, as it were, a keynote to the harmony of the design. These pieces are combinations of different metals. No. 1, a belt clasp of copper very faintly beaten into shape. The floral decoration in silver etched, leaving a dull copper background. This is obtained by a process of firing to just the right degree to bring out the rich tone of the metals, dull brown and old gray silver. The whole is then brushed with a light verde, carefully rubbed off, leaving just a trace of green around the outline of the decoration; a most pleasing contrast of color when finished. Nos. 2 and 3 are brooches. The former of old silver finished in a green of an olive hue and set with a fragment of malachite, cut encabochon. The latter is of silver etched and oxidized in a dark dull brown. No. 4, a watch fob of silver, gold plated and etched, then fired to give an autumn tint to the woodbine motif used as a decoration. No. 5, a hatpin of etched copper and brass. No. 6, lace pin and sleeve button of silver, set with a Mexican fire opal, and No. 7, of copper and silver spider-web motif. These simple pieces do not represent great wealth, or gaudy show; they are simply founded on true principle, and the beauty of the materials used in their making.

Enameling also offers abundant opportunities for the craftsman to carry out his color schemes. So, as I stated at the beginning of this article, it is the design and good workmanship of the artist-craftsman rather than the great money value of the gems or a metal that determine the artistic worth of an object. Thus the selling price of such articles of jewelry are by no means excessive, but well within the means of the average person of good taste. The effect of such work is being felt by the modern jewelry manufacturer, and he is beginning to realize the possibilities in this line. This is proven by the steady increase in the demand for arts and crafts work of all

kinds, especially metal work. Certainly this is an encouraging outlook for the American jewelry trade. Let me here add a word to the student craftsman. In this work the craftsman should study well the materials nature offers him, their different treatment to bring forth their individual beauty to the best advantage; and, if his work is founded on practical reason, aesthetic feeling and true principle, they cannot but help be objects of beauty and worth.

Remember it is far better to create one real work of art, however small, than a dozen gaudy, poorly made objects for show alone.

STANDARD SOLUTIONS FOR MANUFACTURING JEWELERS.

DETAILED INSTRUCTIONS FOR COMPOUNDING AND MANIPULATING.

(Concluded from October.)

BY OSCAR A. HILLMAN.

There are several reasons why the gold and silver solutions offer the most lucrative field to the fake consulting colorers and electro-chemists in which to ply their nefarious business, the two principal ones being that the high price of gold and silver prohibits the colorer from doing any experimenting, and the fact that both gold and silver solutions are very eccentric, and sometimes fall down without any apparent cause. It often happens, however, that the gold solutions are all right, but the articles to be colored have not been cleaned or treated properly before being immersed in the bath, and the consequence is that the solution gets blamed for yielding discolored deposits, and the colorer gets busy with his chemicals and vials, trying to fix it; he generally succeeds in fixing it, the way boys "fix" window panes in a vacant building. An easy way to find out if the solution is to blame, is to clean a few pieces by the same process that the discolored ones were cleaned by, then give them a flash color in a solution that is known to be working properly; if the articles do not flash clear and bright, it is pretty good evidence that the cleaning process is at fault and not the solutions.

MAKING A CYANIDE-GOLD SOLUTION.

The old-fashioned way of making gold solutions by using a gold anode, porous cup, and carbon anode, is, without a doubt, the most practical as well as economical method known, and should be used whenever possible. An advantage that the porous cup way possesses over all other methods, is the rapidity with which a solution can be made; if boiling hot water is used, a good rich one can be made in about fifteen minutes. To make a solution with the porous cup, fill the jar that is to contain it almost full of boiling water, then add the cyanide which will dissolve in a few minutes, making a clear solution. In order to run the requisite amount of gold in, weigh the gold anode and connect to the positive wire with a strip of platinum and immerse the entire anode in the main solution. Fill the porous cup with a strong cyanide solution and suspend it from the negative rod so that the top of the cup will be about an inch above the top of the main solution, then attach a small carbon anode to the negative rod and immerse it in the solution in the porous cup. If a carbon anode is not available, a copper one, or a coil of heavy wire can be used.

When the current is turned on, a lively effervescence takes place in the porous cup and the anode begins to dissolve. The gold anode must be weighed every few minutes, and as soon as enough gold has been run off, the porous cup and carbon anode removed, or the solution is liable to become too rich in metal to work uniformly. As it is very difficult to make absolutely neutral chloride of gold, and almost impossible to convert it into fulminate of gold without losing some metal in the numerous washings, it is false economy to try to use the anode scraps by dissolving them in aqua regia and making gold salts. If the so-called "salt water" solutions are used and it is necessary to use fulminate of gold, all the water that is used to wash the neutralized acids out of it should be carefully saved and sent to a refiner with the old solutions, as it is liable to contain considerable gold.

The fine gold solution that has proven the best for producing the Old English, Roman, and Rose finishes, is composed of:

Water	1 gal.
Cyanide	4 ozs.
Fine gold (24 k.)	3 dwt.

The easiest way to make the solution is to use the porous cup method, described above.

THE OLD ENGLISH FINISH.

To produce a clear Old English finish, it is essential that the articles have a high polish before being colored as the slightest scratch or pit will show very plainly after the article is finished. After making sure that the polish is what it should be, great care must be exercised in stringing up and washing the articles, so that they will not become scratched or stained.

When working on high grade goods, it is advisable to handle one string of work at a time, instead of taking a large number, as is usually done. The articles must be moved rapidly while receiving the deposit, or they are likely to assume a smoky look, especially if the solution is old and therefore contains a large amount of carbonate of potash.

A good Old English finish is a clear, bright yellow color, and should never have a greed or red shade.

THE ROMAN GOLD FINISH.

Of all the gold finishes, the Roman gold is the easiest to produce, because if the color is not satisfactory the first time the article is colored, they can be scratch brushed bright and shaded again, and as gold invariably deposits bright on a gold base, the work is sure to come out right the second time.

When the work to be colored is cheap brass novelties or imitation jewelry that must be colored for next to nothing, it is advisable to add about three ounces of phosphate of soda to each gallon of solution, so that if the work comes out slightly stained, the stains will be yellow and will pass on a very cheap class of goods; if the articles are colored from the acid and no phosphate of soda is used, the stains will be red, and show up quite prominently.

A good Roman finish should have a subdued luster with just enough shine to give it a clean, snappy look. High class articles should have a rich, yellow color, with just a suggestion of red; they must never be canary color or have a greenish tinge.

THE ROSE FINISH.

The Rose finish is undoubtedly the most difficult gold finish to produce, and as almost every retail jewelry

store has a lot of rose colored jewelry that looks as if it had been painted with a mixture of yellow clay and brick dust, then scratch brushed in little spots, it seems to be a color that is very little understood by colorers in general. All the smut finishes look out of place on a flat surface; in fact, the chief function of the smut is to bring the relief of the article into prominence without making the article look flashy or tawdry.

It requires a great deal of experience to enable the colorer to know just which shade of rose will be the most effective, as some articles that would look beautiful finished in a light rose, become very unattractive when finished a dark red rose, and vice versa.

The most economical way to produce the rose finish is to color the articles in an old fine gold solution that is low in gold, until they are coated with a heavy smut, then after relieving them with moist bicarbonate of soda, dip them in boiling water to remove every trace of the soda and give them a quick shade in a comparatively new solution, rinse thoroughly and dry.

If carbonate of potash is added to the fine gold solution a dark red smut will be obtained; if phosphate of soda is added, the solution will yield a heavy, yellow colored smut. Bisulphate of soda or chloride of ammonium should never be used in a rose gold solution, as the former gives the smut a greenish tinge, as if the solution contained some silver, while the latter gives the smut a dead, muddy, appearance.

A good rose finish may be any shade of color from a dark yellow to a somber red, but each piece of jewelry in a batch must be the same shade, especially if they are carded in sets. The smut should have a clean, soft, look with just enough of a mellowed gloss to give it a rich, lively appearance.

THE GREEN GOLD SOLUTIONS.

The green gold finishes, like the rose golds, are soft, smutty finishes that are used exclusively on articles that have a deep background and high relief; they should never be used on articles that are entirely flat or plain.

Articles to be colored antique green must be matt dipped, sand blasted or satin finished, as the green smut assumes a waxy appearance if deposited on a polished or smooth, even surface.

The antique green gold solution should contain, per gallon:

Water	1 gal.
Potassium cyanide	6 ozs.
Carbonate of lead	1 dwt.
Fine gold (24k)	3 dwt.
Fine silver	1 dwt.

The best as well as the quickest way to make the solution is to use an 18k green gold anode and make the solution by the porous cup method; the carbonate of lead should be added after the gold has been run in. The solution is always made with boiling water, but allowed to cool before being used as the smut deposits more uniformly and takes a deeper shade of green in a cold solution.

In spite of the fact that the majority of colorers at present use white arsenic (arsenic trioxide) as a darkener in their green gold solutions, its use cannot be recommended because a gold solution that contains arsenic in any appreciable quantity is very hard to manage and yields a flocculent deposit that lacks the rich, deep color that is obtained by using carbonate of lead as a darkener.

If a clear, soft, light green is desired, the use of bitartrate of potassium instead of the carbonate of lead, will be found effective.

It is always a good policy to use a high voltage (8 to 12) when coloring green gold, in order to insure a clean looking, adherent deposit.

THE 10 TO 18 K. GOLD SOLUTIONS.

The karat solutions are invariably made by the porous cup process. When they are to be used for heavy plating it is advisable to add about three ounces of phosphate of soda, as it helps to keep the deposit from turning smoky.

LACQUERING BRASS BEDSTEADS.

A NEW GERMAN METHOD EFFECTS VARIOUS ECONOMIES.

United States Vice-Consul W. Washington Brunswick, of Chemnitz, describes an improved method in Germany for lacquering brass bedsteads, for which it is claimed a greater degree of permanency and economy has been attained:

Formerly the method was to heat the brass tubes in an oven and then apply the lacquer. In the new method the tubes are placed on a lathe and adjusted and turned by hand or power. The main point is that the tubes while rotating are heated electrically and the heating can be regulated as desired. The lacquer is applied while the tube is rotating, and in this way several layers of lacquer can be applied in a short time, as the electrically charged tube dries the lacquer almost as fast as applied. Formerly a composition of shellac and spirits made from rye was used. The tubes are usually thin and possess a large surface for heating purposes in proportion to their volume, so that the tubes only retain the heat a short time and rapidly cool off. In the old method the tubes were heated in an oven, had to be quickly taken out, and the lacquer applied, then again placed in the oven, remaining there from 10 to 30 minutes, and then another coating was applied. It was important, after the first coat had been applied, to see that no alcohol remained on the lacquered part, so that it would not soften the next application. By the quick evaporation of the alcohol the warm tubes soon became cool and had to be reheated before a new coating could be applied. In consequence the lacquerer must work rapidly, and even then the coating may be defective; and this method required from three to six coatings of lacquer, with the corresponding number of reheatings. The time required for finishing a brass tube was from 1 to 1½ hours, depending on the length and size of the tube and the number of coatings desired. Other methods in use also possess many drawbacks.

The new method requires only a minute for giving a tube several coats of lacquer, since the heating and lacquering form only one continuous process, and no cooling or reheating is required. In other words, the cooling of the tubes, caused by the evaporation of the alcohol, is counterbalanced by the electric heating of the tubes during the process of lacquering. A steady, even heat can be maintained in the current flowing through the tube in spite of the cooling effect of the evaporating alcohol. By this method the tubes do not have to be heated above a temperature of 160 degs. Cent. (228 degs. Fahr.), so that there is no waste of heat, as is the case in reheating in the oven.

Another advantage is that the color of the lacquer does not suffer on account of superheating, as in the old method. The economy in space is also an important factor to be considered, as the ovens and working tables required much space. Now the tube is simply adjusted to the lathe and the current turned on; then all dust that may have accumulated during the heating is wiped off, the tube rotated, the lacquer applied, and the finished tube removed and placed in a rack, the entire process requiring from 45 seconds to 2 minutes.

THE DEVELOPMENT OF MELTING FURNACES.

A Description of the Earliest and Latest Types.

By L. J. Krom.

(Continued from November.)

THE M. R. V. BRASS MELTING COKE FURNACE.

The furnace shown in cut 26 is being manufactured by J. B. Wise, Watertown, N. Y. It is known as the M. V. R. brass melting tilting crucible furnace, and is backed with strong guarantees by the company. They guarantee that one man working one furnace will melt in one day seven heats of metal (either copper, gun metal or yellow brass) capacity 400 to 440 pounds per heat, with a coke consumption of no more than 56 pounds

FIG. 26. M. R. V. COKE TILTING FURNACE.

per heat; or one pound of coke for eight pounds of metal melted.

It is claimed for this furnace that:

1. Coke consumption 50 per cent. less than other furnaces.
2. Crucible expense very considerably reduced.
3. Caster's ashes reduced from 85 to 90 per cent.
4. Labor: one man to melt seven to eight tons per week.

The life of a crucible is from 50 to 54 heats, and some users have reported 60 to 85 heats per pot.

The furnace consists of an outer steel shell and an inner shell of refractory material. The crucible rests on a solid bottom casting and the coke is put around it. A blast of air at a pressure of one ounce enters at the top of the outer shell, and passing down through the space between it and the inner shell, enters the combustion chamber at the bottom through a series of staggered openings in the lining.

By this arrangement a "contused" blast is obtained as against a "cutting" blast, and thereby saves the crucible from severe oxidation, thus prolonging its life. Actual runs in the furnace have shown a shrinkage loss of less than 1½ per cent. Provision is made to take care of spilled metal, or that from a broken pot, so that no metal gets in the ashes, the amount of ashes from a day's run being half a wheelbarrow full. For melting scrap the furnace is equipped with a funnel, which is filled up and its contents gradually settle down as melted, until the crucible is full. By actual test metal produced in the "M. R. V." was found to run 1,800 pounds tensile strength higher than metal made of the same composition and melted at the same time in an oil blast reducing furnace.

THE "IDEAL" TILTING CRUCIBLE FURNACE.

The furnace shown in Cut 27 is manufactured by the Ideal Furnace Company of Chester, Pa. This furnace uses either coal or coke for fuel under low air pressure. The furnace is made of 3-16 sheet iron and is composed of two pieces, main body and locking ring. The body of the furnace, which rests on two trunions, is lined with fire brick and carries its own grate bars and locking ring. This ring connects the furnace with the air supply base when in operation and is locked to body when pouring. Lining is made of 5-inch fire brick, and one special top brick is removable.

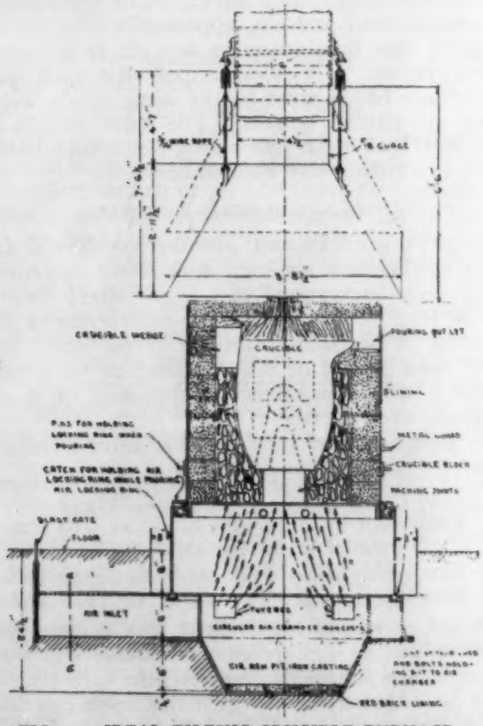


FIG. 27. IDEAL TILTING CRUCIBLE FURNACE.

The manufacturer says of this furnace: "It retains all the strong and well-known features of a pit furnace, combined with the more modern method of pouring by tilting.

"The crucible is not removed from the fire, is always ready for coking (or coaling), never on the bars nor up to the flue, but always in the right place. Not being taken from fire, life of crucible is prolonged, as no ill-fitting tongs are used to crush it. Not affected in any way by weather conditions; draft is under control of operator at all times, and can be increased or decreased at will. Any required amount of the charge can be poured from the crucible, and the balance left in the

furnace will hold its temperature for 1½ hours. No additional fuel is necessary during this time as the air blast is shut off. By this method a heat, or parts of a heat, may be held in the crucible until it is convenient to cast, with no bad effects, such as overheating or oxidation.

"Having perfect combustion a small amount of fuel is used and this is burned to a pure ash, leaving very little waste material to handle. A feature which will appeal strongly to furnacemen is the small amount of radiation thrown off, nearly all the heat being above the operator. As a large volume of air is required, a low pressure blower is used. This minimizes oxidation and insures a more perfect combustion. Nearly all other types of furnaces use 12 ounce or more. The furnace meets all insurance requirements as there is no more risk than with pit fires. Melting cost is less per pound than any furnace on the market."

COMPARATIVE TESTS.

"A test made with the 'Ideal' furnace in comparison with a pit furnace resulted as follows:

No. 1.	Ideal Furnace.	Per Cent. Loss.	Pit. Furnace.	Per Cent. Loss.
Yellow turnings	100		35	
Yellow gates	100		35	
Yellow scrap	200		35	
Yellow ingots	200		71	
	600	(2.8)	176	(3.5)
No. 2.				
Yellow turnings	400	(7.0)	175	(8.0)
No. 3.				
Yellow scrap	250		90	
Yellow gates	250		90	
	500	(2.75)	180	(4.4)
No. 4.				
Yellow ingot	600	(1.0)	175	(2.0)

Same class of metal used in both furnaces. These figures show that a large body of metal can be melted with our method with less melting loss than pit furnace."

COST OF OPERATING.

The operative cost is claimed to be very low as shown by the following data:

	Per 100 lbs.
One (1) set Linings, $10.00—350 heats of 600 pounds—210,000 pounds	$ .005
One (1) No. 225 Crucible, $12.00—35 heats or 21,000 pounds	.060
Twenty (20) pounds coke, $2.50 ton (f. o. b.) ovens)	.025
Total cost	$ .090

KROESCHELL-SCHWARTZ GYRATING FLAME CRUCIBLE FURNACE.

A furnace of this type is the Kroeschell-Schwartz furnace, the invention of Edward Schwartz, the well-known inventor. The furnace is shown in section in Fig. 28. Some of the advantages claimed for the furnace by the manufacturers, The Kroeschell Brothers Company, 55 Erie street, Chicago, Ill., are as follows:

In the old style coke or coal crucible furnaces, more or less trouble is experienced by the necessity of lifting the cover of the furnace for the purpose of feeding the metal into the crucible; also, by having to feed the fuel around the crucible, and at times having to raise the crucible higher up in the furnace, the bed of fuel having been burned out allowing the crucible to sag too low into the furnace, causing cold metal in the bottom of the pot.

By the use of a crucible furnace with oil or gas as fuel, this trouble is done away with. The greatest difficulty thus far has been to obtain an even heat in an oil or gas crucible furnace, so as to melt from the bottom of the crucible up. This has been the most important problem in all gas or oil furnaces. This feature has been accomplished in the Kroeschell-Schwartz gyrating flame crucible Furnace where the melting is actually done from the the bottom up.

Another important point in this new furnace is the keeping of a neutral flame or perfect combustion of the oil or gas fuel in the furnace by a low pressure air blast, so as to properly atomize the oil fuel, or to properly mix the proper amount of air when using gas as fuel. The objection to the noise made by the burning of oil or gas as fuel has been reduced to a minimum in the Kroeschell-Schwartz crucible furnace by their patent combination oil and gas burner. This is accomplished by the blast of air being deflected in the burner itself; this also insures the perfect atomization of the oil under a very low pressure, and when burning gas as a fuel causes a perfect mixture of air and gas, thereby utilizing the heat units contained in the fuel to the very best advantage.

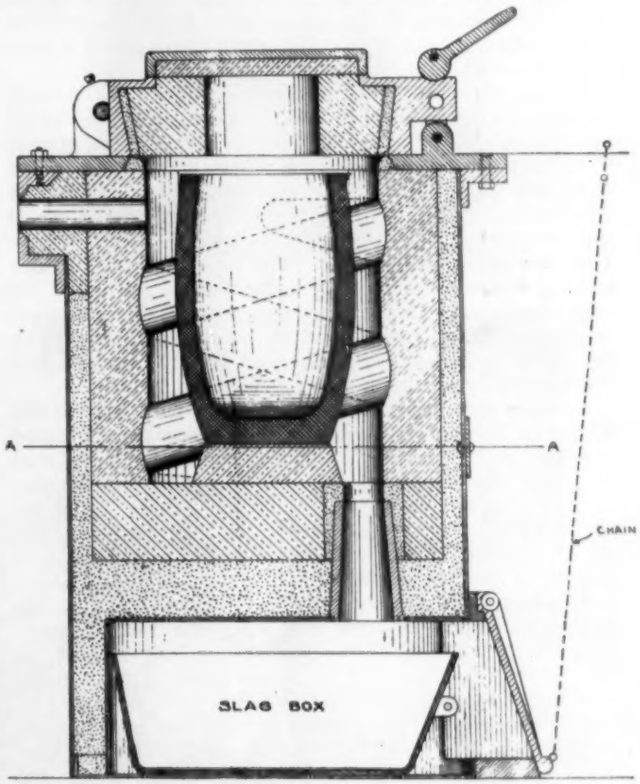


FIG. 28. KROESCHELL-SCHWARTZ GYRATING FLAME

Slagging up of the furnace and getting slag from the furnace, also the question of spilled metal from a broken crucible or otherwise, are very important items in oil or gas crucible furnaces. In the Kroeschell-Schwartz crucible furnace the slag or spilled metal is dropped through two slag holes in the bottom of the furnace and deposited automatically into an iron ingot mold in the pit of the furnace, from whence it is easily removed. These slag holes also are used as air ports through which air is forced into the bottom of the furnace or combustion chamber, thereby insuring perfect and complete combustion, at the same time tending to hold the heat in the bottom and creating an even heat throughout the furnace.

The feeding-up of the metal into the crucible is also done through the cover of the furnace; this cover being supplied with a hole in the center of same large enough

for this purpose. The waste gases also pass through this hole, and in so doing preheat the metal before it drops into the crucible. After the crucible has been charged, the feed opening is closed by means of a smaller door; the products of combustion then pass through an opening in the back of the furnace, from whence the escaping gases and heat are discharged direct into the flue. This carries away all escaping gases and heat, also causes the furnace to operate noiselessly and prevents oxidation of the metal. The question of lining for an oil or gas crucible furnace has to some extent been an argument against this style of furnace; this important point, however, has been entirely overcome by making the body brick entirely in one piece and by obtaining an even heat throughout the furnace. The burner being operated at a very low air pressure, 1 pound, and the air blast being deflected inside the burner also insures long life to the lining. For the same reasons as stated above the crucible wears evenly, and the life of same is increased to a very marked extent.

By actual operation and test in this furnace, 100 pounds of yellow brass or bronze is melted with 1½ gallons of oil per 100 pounds of metal, and such metal can be poured 40 minutes after placing the crucible in the furnace. This work was done in a No. 60 crucible. With the use of illuminating gas of 600 B. t. u., 300 pounds of metal was melted with a consumption of 817 cubic feet of gas. The melt being 300 pounds. The time required for this melting was 65 minutes. By using natural gas or oil the time would be reduced in proportion to the increased number of heat units in said oil or natural gas. With this showing it can be readily seen that the cost of fuel is considerably less than when using coke or coal.

Another very important feature to be considered is the saving in labor of operating these furnaces as compared with the ordinary crucible furnace in which coke or coal is used. Furthermore, the oil or gas-heated crucible furnace can be operated continuously, there being no cleaning out of the furnace necessary after removing the pot for pouring and before another pot of metal is placed therein, so that the operation of the furnace is practically continuous. The new pot of metal being placed in the furnace immediately after removing the heated metal prevents the cooling of the furnace or loss of heat, so that every succeeding pot of metal enters a thoroughly heated furnace from the start, insuring a large saving of fuel. From six to twelve heats per day can be obtained, according to the size of the crucible used. The temperature regulation with gas or oil is absolutely under the control of the operator, so that any temperature required for different metals can be obtained, and any given temperature held for any desired length of time.

These furnaces have been so constructed that the space required for same is identical with that required for the old style coke or coal crucible furnace; so that where it is desired to replace old-style coke or coal furnaces with the gas or oil furnaces, no change is necessary. The new will simply take the place of the old. This refers to floor space as well as the depth of furnace.

SINGLE AND DOUBLE COMBUSTION CHAMBER FURNACES.

The W. S. Rockwell Company, 50 Church street, New York, manufacture the furnaces shown in cuts 29 and 30. The furnaces are identical in manner of construction, the only difference being the single and double combustion chambers as will be seen in the illustrations.

The body of the furnace is made of sheet steel, with riveted side seams. The bottom and top plates are cast iron, flanged and bolted to the steel shell. The steel trunnions are also bolted to the shell. They rest on cast iron legs, which may be bolted firmly to the foundry floor or to a brick or concrete foundation on the level with the foundry floor. The furnace is tilted by means of an ordinary hand wheel, worm and gear.

The lining is made of the best quality fire tiles, laid in an outer and inner ring. The outer ring requires no repairs. The inner ring will last far longer than the lining of any coal or coke-fired furnace, and it is easy and inexpensive to put in a new one when necessary. Together they form a thick lining, ample for protection against radiation.

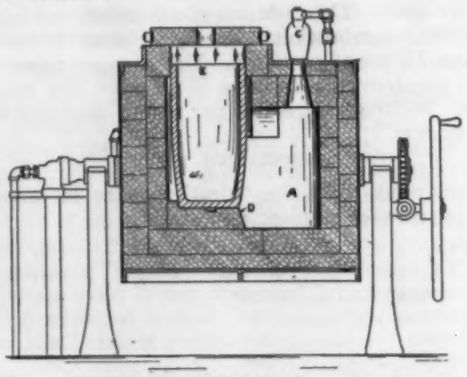


FIG. 29. SINGLE COMBUSTION CHAMBER FURNACE.

The burners are on top at the side, out of the way, and easily accessible. They are supplied with fuel and air through pipes connected with the farther trunnion. These connections are not disturbed when tilting, and the burners can be operated with the furnace in any position, and while pouring if desired.

The top cover is a single fire tile, banded with iron to prevent cracking and to support attachments for lifting. It is lifted by means of a lever and may be held in any desired position.

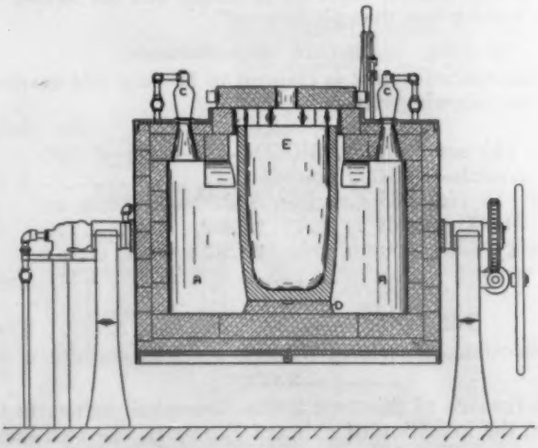


FIG. 30. DOUBLE COMBUSTION CHAMBER FURNACE.

Fuel oil at pressure of 5 pounds per square inch or higher may be used. Whatever the pressure may be, it must be uniform. Natural gas, water gas or city gas of average pressure may be used.

The furnaces are the same for all these fuels, but the burners differ, also the pipe connections. For operating these furnaces the makers recommend a positive pressure blower that will not give less than two pounds pressure. One of the chief features of these furnaces for which superior advantages are claimed, is the single and double combustion chambers.

In the single chamber furnace where the chamber, crucible and weight of the charge are comparatively

small, the flame and heat from the combustion chamber lap well around the crucible and melt the charge of metal rapidly from all sides, so that the average time to melt a 400 lb. charge of brass or copper is about 45 minutes after the first heat has been taken out. Owing to the fact that the furnace is cold upon the initial charge, the first heat consumes about one and one-quarter hours. But when 800 or 1,600 lbs. charges of metal are to be melted, the mass of cold metal in the crucible absorbs the heat so rapidly that unless the furnace is supplied with more than one combustion chamber the time of melting is too much prolonged. Besides the loss of time there is a tendency to oxidation and wasting away of the metal in the crucible. This is especially true when scrap brass carrying a high percentage of zinc is being melted, or where metals with a high melting point are used.

When large quantities of metal are to be melted in regular practice it is cheaper to melt in a large crucible, and it is then easier to obtain more uniform metal. In this connection it may be said that the fewer the units of a melt the fewer the opportunities for error. The labor required to operate an 800 or 1,600 lbs. Rockwell furnace is practically the same as that necessary with one of 200 or 400 lbs., while the time consumed is proportionately smaller owing to the even distribution of heat upon all parts of the crucible. The furnace is of practically the same construction as that of the single chamber, with the exception that two burners are used, and a combustion chamber is situated upon each side of the crucible.

One valve governs both burners and there is but one air valve. They are conveniently reached from the hand wheel so that one operator may control every operation from this location. The furnaces are built in four sizes with a melting capacity of from 200 to 1,600 pounds of metal.

Some of the advantages claimed for these furnaces are: "The Rockwell crucible melting furnace possesses every feature necessary for the production of pure, clean metal. The area of exposure is small. Combustion is complete and clean, the heat clear and strong, and well suited to rapid melting without burning. The flame being directed toward the bottom of the furnace the bottom of the crucible is always hot, and as the flame rises around the crucible it hugs it on all sides and fills the space beneath the cover to protect the metal on top. The cover need not be lifted to pour and the metal is not exposed. The flame having to travel from top to bottom of the furnace and back again has ample time for combustion, with easy, gentle action upon both crucible and metal."

W. S. ROCKWELL STATIONARY LIFT OUT CRUCIBLE MELTING FURNACE.

The furnace, shown in Fig. 31, is manufactured by the W. S. Rockwell Company and is of the same general type as their tilting furnace, except that it does not tilt but sets in a pit. It is connected to flue and chimney the same as a coke furnace and the crucibles are lifted out and carried to the molds in the same manner. The lining is made up of tiles, one inner and one outer ring, the inner one being renewed only, the outer remaining in the furnace permanently. Standard crucibles from No. 70 to 90 are used and the furnace is run with gas or oil.

CLAIMS.

The company claims for the furnace:

"It requires from 2 to 3 gals. of oil per 100 lbs. of ordinary brass; or 400 to 600 cu. ft. of gas.

"It requires about one hour and forty minutes to make the first melt (250 lbs.) in the morning; after that from 1¼ to 1½ hours each melt.

"It carries a high temperature and will melt high-class metal and produce sound castings. It will melt cast iron, Monel metal and nickel.

"The metal loss by shrinkage is very small. There is no loss of metal in ashes. Scrap charged through the

FIG. 31. STATIONARY LIFT-OUT FURNACE.

opening in the large cover must fall directly into the crucible. There is very little flame or heat outside of the furnace during operation. There is very little noise."

"STEELE-HARVEY" CRUCIBLE FURNACES.

The Monarch Engineering and Manufacturing Company, of 1204-1206 American Building, Baltimore, Md., manufacture various types of crucible melting furnaces operated by oil or gas and air from 1 to 30 pounds pressure. In Cut 32 we show the stationary "crane lift" non-tilting furnace. This furnace is exactly as a pit furnace and can be installed either singly or in batteries of from four to eight, using only one blower for complete equipment. The company state that it has a record of melting with normal gas, using only 225 cubic feet for 100 pounds brass, and in using No. 70 crucibles, ten heats per day, or with oil, 2 gallons per 100 pounds metal, and loss less than with a coke furnace. They also are now placing on the market

FIG. 32. STATIONARY "CRANE LIFT," NON-TILTING FURNACE.

their "Monarch" double crucible lift out furnace for very small class of harness, hardware or chandelier

work, using crucibles from numbers 16 to 60—requiring only one large burner to each furnace.

Their original furnace, which has now been on the market since 1903 is known as the "Steele-Harvey" rocker cover tilting, melting and refining furnace, now installed generally in the large foundries in all parts of the world. The "Steele-Harvey" furnace composes an outer shell of steel, firmly riveted and lined within with a solid shape of carborundum or composition, both sides and bottom; the life of lining is 500 heats, and the furnace is arranged for sufficient heating space, between crucible and the walls of furnace. The burner for oil or gas, has a reducing flame and is placed outside away from fire entrance, so that it will secure free air, and the air and oil or gas, mixing, form a gas which ignites within the walls of the opening. The flame is played against the edge of a bare block, upon which the crucible rests, thereby deflecting same and not allowing the heat to play against the bottom or sides of crucibles. The flame is even and completely surounds the pot and circulates upwards and over the crucible and out through the center hole of cover, thereby protecting the contents of crucible from oxidizing effects. The cover is arranged, "flat dome effect," and is made of the best Woodland fire brick or composition refractory clays procurable; it is burned at

FIG. 33. MONARCH IN POURING POSITION.

4000 degs. Fahr., and is attached to their new Rocker —design of lift "back or forward" ratchet mechanism. The cover is on while metal is "melted and poured." See Cut 33. The gearing is simple, worm or cut. The tilting is easy and the automatic cover attachment enables the operator to charge the furnace, stir and skim, before pouring. One man can attend to three furnaces. The furnace is swung between two upright trunnions for tilting, and is always under the control of furnaceman.

No danger from dipping, as they arrange for "patent brake" or the worm wheel. Furnace can be placed at any angle for necessary attention. Special arrangements are made for prompt removal of slag. It is placed above ground, consequently no loss of waste metal as heretofore.

The crucible is always retained within the furnace, thereby losing no heat in cooling off, and its life is increased by not using tongs. The crucibles are straight side and full measure, and are secured in place by extension pieces of brick in rear, and at lip. A plan is arranged for continuous pouring channel, and a new patented attachment is in the form of a swinging saddle in front, just under pouring lip for bull ladle or receiving crucible, so that the molten metal is not exposed to chilling. As the furnace is tilted the receiving pot swings with it. The furnaces are made for crucibles from number 12 to 600. The furnace is guaranteed to save 50 per cent. over old methods. (To be continued.)

STANDARD SPECIFICATIONS FOR NON-FERROUS METALS AND ALLOYS.

A committee to formulate standard specifications for the non-ferrous metals and alloys, as well as for alloy steels, is now in process of organization under the auspices of the American Society for Testing Materials. This committee will consist of about 12 members, representing both consuming and manufacturing interests.

The American Society for Testing Materials was organized in March, 1902, at Philadelphia, Pa., for the purpose of "The Promotion of Knowledge of the Materials of Engineering, and the Standardization of Specifications and the Methods of Testing." The officers of the society are: President, Charles P. Dudley, chemist, Pennsylvania Railroad, Altoona, Pa.; vice-president, R. W. Lesley, president American Cement Company, Philadelphia, Pa., and secretary-treasurer, Edgar Marburg, professor of civil engineering, University of Pennsylvania, Philadelphia, Pa.

The American Society is affiliated with the International Association for Testing Materials, which held a congress in Copenhagen, Denmark, last fall. The sixth International congress will be held in the United States in 1912.

DECISION ON ELECTRO-GALVANIZING.

A recent decision of the Court of Appeals of New Jersey, Judge Gray presiding, affirms the judgment of the lower court in all respects in the case of the Hanson and Van Winkle Company, Newark, N. J., and the U. S. Electro-Galvanizing Company, Brooklyn, N. Y. The Lower Court decided in favor of the Hanson and Van Winkle Company and the Court of Appeals affirms this decision and also finds that there had been no infringement and invalidates the patent on the ground that the alleged invention of an electro-galvanizing solution and process was anticipated by foreign patents. The first verdict was rendered on June 8, 1908, by Judge Cross in the Circuit Court of the United States, District of New Jersey, in the suit brought by the U. S. Electro-Galvanizing Company against the Hanson and Van Winkle Company. The essential feature of the decision being "that the defendant's bath is not the bath of the patent in suit, nor is it any one of the baths of the patent in suit, nor is it the bath of any one of the claims of the patent in suit; defendant's bath is not prepared the same way as the bath of the patent in suit." The Bill of Complaint was accordingly dismissed with costs. An appeal from this decision was taken by the U. S. Electro-Galvanizing Company and the recent decision mentioned affirms the opinion of the lower court. The case refers to the right of using the electro-galvanizing process in the United States.

TO GALVANIZE METAL WITH A BRIGHT AND SHINING ZINC COVERING.

According to "Methods et Alliages" 1909, II 24 the process is as follows: The bath to be used is the ordinary one of zinc sulphate with ammonium sulphate, but rendered slightly acid by the admixture of sulphuric acid (1/28 to 1/20 normal). The process is carried on at the ordinary temperature and with a current of about 80 ampere per square decimeter, or say per 4 inches square, and at a tension of 0.75 to 0.85 volts. The zinc deposit thus produced is very dense and adheres well.

INSTITUTE OF METALS.*

DISCUSSION OF E. L. RHEAD'S PAPER ON NOTES OF CORROSION OF COPPER AND BRASS.

Sir Gerard Muntz, Bart., in opening the discussion, said that the subject of the corrosion of metals, not only in sheathing but also in other matters, was always with them. He was always receiving inquiries on the subject, not only from their own customers, but also from other people. Mr. Rhead had told them that the pitting was usually on the steam side, but that did not agree with his (Sir G. Muntz's) experience. They had found pitting very seldom on the steam side. When it did occur there, it was almost always the result of using improper oil containing acids or large proportions of carbonaceous matter. The tubes he had had to deal with were nearly all pitted on the water side. Mr. Rhead had found the pitting chiefly on the lower half of the tube. This was what was to be expected. It stood to reason that any deposit in the tube would gravitate to that side, and the deposit was usually the cause of the trouble. Particles of carbon or iron, &c., adhering to the upper side of the tube would probably fall off owing to vibration. The occurrence of the pits in lines might be due either to continuous deposits lying along the bottom or to "spills" on the inside surface of the tubes, usually the result of the adherence of particles from the cores in castings, these subsequently becoming elongated in the process of drawing. In the latter case the line of the spill was still traceable if the surface were scraped. The seeming plugs of copper in tubes were really only "pits" with the copper remaining in situ, the zinc having been abstracted.

In ninety-nine cases out of one hundred, the deposit found in tubes was something which had been brought in by the circulating water. The chief causes of pitting were: Deposit containing hydrates or chlorides; cinders drawn in from ash discharge, and particles of carbon embedded in the brass in the process of manufacture. The destructive action in each case was electrolysis set up by a galvanic couple between the zinc in the brass and the carbon or iron. Many cases of corrosion were the result of the flow of the circulating water being too slow to scour away the deposits.

Another cause of corrosion was the decomposition of air and gases. This might result in too slow a flow in the circulation and the consequent overheating of the water. It might also be caused by misplacement or malformation of the water intake bringing about the introduction of an excessive quantity of free air. He had met with many cases of this nature, where, after several sets of tubes had failed, an alteration in the intake had been made, and the trouble had altogether ceased. In one instance, the trouble occurred inside eighteen months, but by the alteration of the intake, it was completely remedied, and the condenser had now been running seven years without any trouble. Too often there was not sufficient care taken to keep out of the condenser matter which would cause obstruction. Ash discharge pipes on ships were often placed forward of the condenser intake, and the natural result was that cinders were drawn in with the water. He had found all sorts of funny things in condensers which had been returned to him as defective. He had found a very considerable number practically wadded almost solid with seaweed and shrimps. Shrimps were very good things in their place, but that place was not a condenser tube. (Laughter.) Of course, in each case, the user had in the first place put the blame on the maker.

Referring to Mr. Rhead's remarks on the corrosion of Muntz's metal, and of the hard metals in comparison with annealed, he could confirm Mr. Rhead's remarks as to corrosion being more rapid in hard metal than in annealed. It was a fact which was proved by his (Sir Gerard's) grandfather's experience seventy-five years ago, in the very early days of the application of Muntz's metal to ship sheathing. Unannealed sheets were tried and were found to wear away at a most alarming speed, so that although they were cheaper to make, the result of the experiment was disastrous. The unannealed sheets were reduced to the texture of lace in a few weeks. The nature of the corrosion was peculiar, both copper and zinc being removed and the residue remaining quite tough and containing in correct proportion the original ingredients. It was not at that time ascertained how this came about, and as far as they knew, the cause of this peculiar behavior of hard metal in sea-water had never yet been satisfactorily explained.

The appearance was quite distinct from that of Muntz's metal, which had been described by the electrolytic obstraction of zinc, the latter being absolutely rotten and brittle and containing a marked excess of copper. The statement by Mr. Darley that the latter trouble with the corrosion of Muntz's metal began in the year 1899 was approximately correct. Mr. Darley, of course, was speaking of metal in use, and the trouble really began with metal manufactured in 1898. It was a significant fact that that was the first year in which electrolytic copper was used for the manufacture of Muntz's metal. At Muntz's Metal Company's works there had been absolutely no other variation in the practices of manufacture inculcated by the patentee three-quarters of a century ago. Years were spent in trying to find out whence this trouble arose before any light was thrown on the subject. They made a most exhaustive search and a very elaborate series of investigations in their own laboratories. They also called in the assistance of distinguished chemists and metallurgists from outside, for whose services they had the honor of paying several hundred guineas, but without any result accruing.

It was not until after several years of careful experiment and investigation that they finally located the trouble. That was within quite a recent period. It would be too long a story to tell them how at last it was arrived at, but the explanation resolved itself into the use of electrolytic copper in the manufacture of the sheathing, and the use of cheap black varnishes in the affiixing, in place of the previous use of smelted copper and genuine Stockholm tar. The result of these two changes in practice was the setting up of electrolytic dissolution by the formation of a galvanic couple between the carbon in the varnish and the zinc in the metal sheets, the carbon acting as a cathode and the zinc being rapidly abstracted from the sheathing. Further, they proved that Muntz's metal when made of the purest metals was very much more liable to electrolytic dissolution than when made of metals not quite so pure. The presence of certain impurities in minute quantities undoubtedly had a beneficial effect in retarding electrolytic dissolution. He would like some of their scientific members to tell them why. His firm ceased to use electrolytic copper in sheathing, and advised their friends to avoid cheap black varnish.

*Paper read at Manchester, England, meeting held October 15, 1909. Paper published in THE METAL INDUSTRY for November, 1909.

The greatest cause of the trouble of corrosion of brass in sea-water was the juxtaposition of carbon.

Mr. G. D. Bengough (Liverpool) said that the first five pages of the paper were descriptive in a general way of phenomena with which most of them were too familiar. With regard to the suggestion put forward to account for the phenomena, it might be as well to define a little more precisely the general fundamental ideas at which chemists had arrived only recently and after much laborious investigation. He was sorry Mr. Rhead had not done that himself. The electrolytic theory of the corrosion of metal was of much use in furthering the study of the corrosion of iron and steel, and had indicated the dirtection in which prevention might be looked for.

It was known that the effect of adding zinc was to slow down corrosion, *i.e.*, it diminished total corrosion. That was to say alpha and beta solid solutions were less electropositive than copper, but from them the zinc went into solution. H plated out at the cathode in sea-water. NaOH reacted with the copper, giving a corrosive product of cupric and cupric and zinc chlorides, and at those points copper was being removed, while at the nodes zinc was going into solution. It was well known that, generally, worked metal was electropositive to soft material. Hence the results obtained by Mr. Rhead in his ferric-chloride tests, which showed the greatest total corrosion. That also accounted for the copper enrichment round the cut edges and the polished and scratched sides of his plates. Those were not deposits of copper as they were called, but areas from which zinc had been dissolved. The only deposits formed in brass sorrosion were deposits of mixed hydrate of Cn. and Zn. formed at the cathode by the OH which had plated out, metallic copper being found at the anodes. Slate slag or carbon deposits were electronegative to copper and brass, and formed cathodic nodes, the actual solution of copper and zinc, as the case might be, going on elsewhere and showing coppery areas. Such deposits should be removed as far as possible, and tubes should be as uniform as possible. Uniformity—physical and chemical—was the desideratum in alloys to withstand corrosion.

Although a plate might be annealed, there might be small differences in the work that was put on it at different points. The annealing process would not entirely do away with the effect of the working, and with these small differences they would inevitably get corrosion set up, the harder parts being positive and the smaller parts being the cathodes. The upshot of all this was that all such work over a brass bar or plate must be very evenly distributed if the metal was to resist corrosion satisfactorily. He did not think there was very much to be got out of a simply descriptive paper such as that of Mr. Rhead, unless they could get from the facts given them some line of work for future investigations. He thought that line was afforded by the electrolytic theory.

Mr. A. Sinclair (Swansea) was glad to hear from the interesting experiences of Sir Gerard Muntz that others besides himself had met with difficulties with regard to corrosion. It was only necessary for him, as following other speakers, to add a third point, namely, the effect of vagrant electric currents escaping from the electric equipment. He had investigated the breakdown of several condenser tubes, and had found that electric currents had actually perforated all the tubes at various points. Probably Sir Gerard Muntz had had a similar experience. So many such cases had come before him (Mr. Sinclair) that he was inclined to emphasize this point. In two cases, one with an engine driving an alternator, and the other with an engine driving a continuous generator for tramway purposes, he found that in the latter case the tubes were constantly being worn through, corroded in the usual way, and except where the wear was taking place the tube was otherwise perfect; while the other case, that of the alternating current, there was no cause of trouble at all. They had all thought that with tramways which had a return current tuyere there might possibly be a current passing through the water pipes which offered an easier path. This current probably went through the condenser. Some might say, "What harm will it do the condenser? It is simply metal, and the current will all pass through." But he found that the various joints in the condenser created such a condition that there was very poor conductivity. The result was that the currents passing through the condenser used the water as a conductor, and in so doing set up electrolysis. One particular case was that of some steam pipes—not a part of the condenser, but carrying waste steam from the jacketing of the cylinder, and it was where the drops of water were formed that these perforations took place. He also found that in some cases the pitting came from the inside to the outside and in others, from the outside to the inside. In this case he not speaking of a generator supplying the town with a continuous current on the three-wire principle, and, of course, the middle wire was earthed. It was quite easy to conceive the electricity leaking from time to time from that earth wire according to the fluctuations of consumption on both sides of the middle wire. In that case, he found the pitting taking place from the outside to the inside. With regard to the leakage, he had found a differential reading as high as 10 volts in a 550-volt circuit, and everyone knew that if they added to 10 volts the resistance of sea-water, they would get a considerable current, and naturally they would expect bad results. With regard to sheathing alloys and condenser tubes, he had had several cases very much the same as those which had been spoken of. It was rather a serious matter when such things occurred within eighteen months or two years of the tubes being put in, and the Institute might with advantage investigate all the points connected with it, certainly the point he had specially mentioned, for he had had at least half a dozen cases. He found this sort of thing particularly where electric lighting stations were concerned and sea-water was used, and very seldom in towns which used fresh water. In one case it was known that the water was very impure and practically water from works. He was following these matters up, and one suggestion he had to make was that the whole condenser might be made electrically continuous by threading the joints with wire.

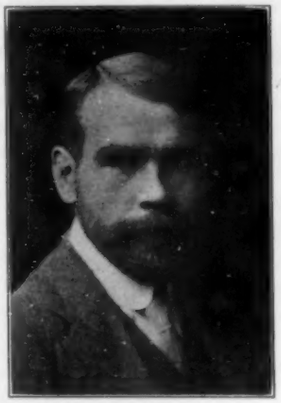
The President suggested that as Mr. Rhead himself acknowledged that there were other facts which he had not dealt with, he might, as he would have the right to do, add to or modify his paper before publication. In the meantime Mr. Rhead would perhaps reply briefly to some of the points raised.

Mr. Rhead said that his paper had served its purpose. It was intended to raise a discussion, and he thought it had done so. He was much obliged to Sir Gerard Muntz for his interesting remarks. With regard to the electrolytic theory, Mr. Bengough would find a reference to it on page 7, where it was stated that Professor Arnold and others had dealt with the separation of different components of varying composition and other such matters. The exact ionising theory was not there, but he had thought that the reference to Professor Arnold's work would have been quite sufficient.

THE ELASTIC BREAKDOWN OF NON-FERROUS METALS.*

By C. Alfred M. Smith, B.Sc.†

OBJECTS OF THE PAPER.



C. ALFRED M. SMITH.

Experiments have been made by the author to inquire into the failure of the materials used in engineering work. During the course of the researches, several unexpected problems presented themselves for solution. The first object of the work was to test ductile materials under combined, or compound stress, in order to see whether any definite law could be formulated for their elastic failure. At the time that the problem was attacked by the author, there was a great deal of uncertainty concerning the failure of mild steel under combined stress. Preliminary experiments, and a study of the few results then published, led him to believe that the elastic failure of mild steel could be accounted for by a law which would be of assistance to engineers, and would also be sufficiently accurate for all practical purposes. These investigations have been published by the author.

Having concluded these tests on mild steel, it was desired to repeat and compare them with similar tests on non-ferrous metals. That is the main object of the present paper. There are included, however, several other tests, which it was unnecessary to make upon steel, but which seemed essential in the case of non-ferrous metals, because, as the work progressed, it was seen that their elastic properties were different from those of steel, and, so far as the author was aware, had never been previously recorded in detail.

The investigations included tension and compression tests, and upon this subject it is hoped that new evidence has been produced. This has been supplied by the use of an instrument invented and made at the East London College, which has been called the sphingometer. See Fig. 1.

The general principle upon which the instrument depends is that of a twisted strip used by Profesors Ayrton and Perry. They have shown fully the theoretical considerations, and the practical results obtained when such a strip is used for measuring the value of electric currents. It is, therefore, unnecessary to again prove that the angular rotation of a mirror fastened to the strip is proportional to the extension (or shortening) of the length of the strip.

THE ELASTIC LIMIT.

Before any theory of elastic failure of materials can be tested by experiment, we must definitely decide what is meant by that term. The following definitions of Le Chatelier have been given:

(*a*) The elastic limit of a perfectly annealed metal should be zero.

(*b*) The perfectly brittle metal is one in which the elastic limit is identical with the maximum stress.

If we accept these definitions, it is clear from (*a*) that we can give no experimental proof of elastic failure for such a material, and (*b*), that we can build up our evidence for the elastic failure of brittle materials only by fracture tests.

There are, clearly, a very large number of materials used in engineering practice which, according to these definitions, are neither ductile nor brittle. It is by testing these materials that we shall find that there is a certain fairly definite relation between stress and strain until a certain stress is applied. After this point there is a redistribution, and it is difficult to say with precision what does actually happen to the materials. There is, with materials which are commonly called ductile (*e. g.*, mild steel and brass), a reduction of area when the load gets beyond a certain value. The rate of application of the load will affect the ultimate fracture stress value, and it is very difficult to make comparisons concerning ultimate fracture values.

When first a tensile or compressive load is applied to a specimen, the inequality of stress distribution is extremely noticeable. It is by no means unusual during a tension test for two strips of the instrument to extend, and one to shorten.

There are three reasons which may account for this phenomena. They are:

(*a*) Lack of homogeneity of the material.
(*b*) Non-axial loading of the specimen.
(*c*) Initial bending of the specimen due to turning (or springing during the operation of turning) of the specimen.

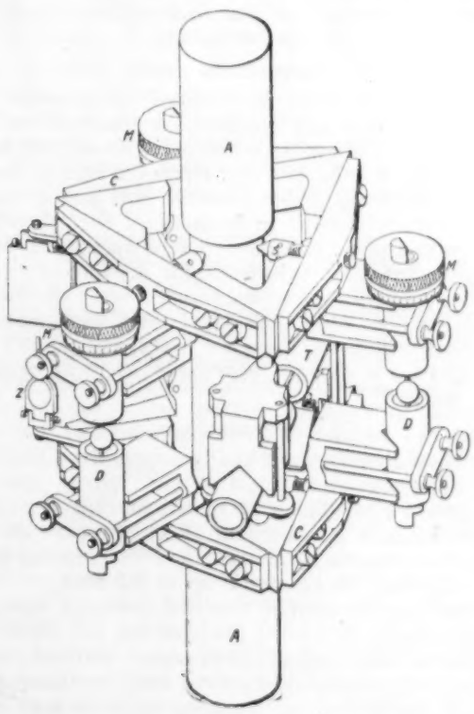


Fig. 1.—The Sphingometer arranged for Torsion as well as Tension or Compression Tests.
A, Specimen. M, Micrometer head. C, Castings for frame. S, Set screw. T, Torsion tube. D, Strip casing. Z, Zero mirror.

It is here enunciated that the unequal distribution of stress upon the specimen is the most determining cause of the unequal strains recorded during the experiments. It is the strain readings just previous to elastic failure which are most import-

*Abstract of a paper read at Manchester, England, Meeting of Institute of Metals, held Oct. 15, 1909.

†Assistant Professor of Engineering, East London College [University of London].

ant. From these we are able to deduce the maximum stress upon the material, and compare it with the mean stress. To show this clearly, the author mentions a test, in which a specimen of mild steel showed from such deductions that a maximum stress of more than 13 tons per square inch was really on the specimen, while the mean stress recorded was 4.5 tons. This was an extreme case, but it would have been passed as normal under the usual conditions of recording extensions. In other words, it would have been recorded that the material had a load of 4.5 tons at elastic failure, from which the average stress is 12,840 lbs., whereas really the maximum stress was practically three times this amount.

TENSILE TESTS.

The machine used throughout the work was an ordinary 50-ton vertical Wicksteel testing machine. The load was applied by means of a pump. For all the tests upon the elastic properties of materials the pump was operated by hand, and the increments of load were usually 0.1 ton. For the tests on ultimate fracture, the pump was operated by a belt, and the beam of the machine was prevented from falling on the stop which would have, momentarily, released the load.

For tests on material under compound stress the tension grips and spherical seats were placed on specially constructed ball bearings, and consequently a torque could be applied while the specimen was under a tension stress. The torque was applied by loading bars fastened to the top and bottom of the specimen. Cords were carried from these bars over four bicycle wheels, which were practically frictionless pulleys.

COMPRESSION TESTS.

It is when we come to compare the behavior of materials in tension and compression that we realize the necessity of making the yield-point stress the basis of comparison. For beyond that stress the area of the specimen is diminished under a tensile pull and is increased in compression tests. In both cases the "time effect" is so great and so indefinite, that it appears to be quite impossible to make deductions for it.

In carrying out the investigations covered by this paper, tension, torsion and compression tests were made upon mild steel, aluminum, copper, brass and Muntz metal. We have space only to give some of those applied to Muntz metal.

MUNTZ METAL.—TENSION AND TORSION TESTS.

These specimens were kindly supplied by the Muntz Metal Company, Ltd.

A tension test (M3*a*) is shown in Fig. 2. There is very considerable "elastic limit effect" from about 5 tons. The load was taken to 9.6 tons, and on retesting the material was found to be elastic up to 9.2 tons.

A torsion test showed that the material was elastic up to a stress of 13,200 lbs. per sq. in., after which the "elastic limit effect" was most marked, as well as the "time effect." The final reading taken gave a stress of 24,500 lbs. per sq. in., and there was no evidence of a decided yield. From this it would appear that the absolute breakdown of the material in torsion is high.

EFFECTS OF OVERSTRAIN ON MUNTZ METAL.

Figs. 2 and 3 show that the effect of overstrain on this material is to make it more elastic.

RESULTS OF TESTS.

It is observed that the appearance of the fracture of the copper specimens resembles that of mild steel, which leads one to believe that the cause of elastic failure of the two materials may be the same. Additional evidence that copper fails by shear is supplied by the following experiment made by the author:

A closely fitted steel plunger was placed in a tube plugged at one end; the length of the tube between the plug and the plunger was filled with wax. The tube and plunger were then placed in a compression machine so that the plunger pressed on the wax inside the tube. As the load was put on the machine, the tube is under two principal stresses, and the shape of the fracture shows

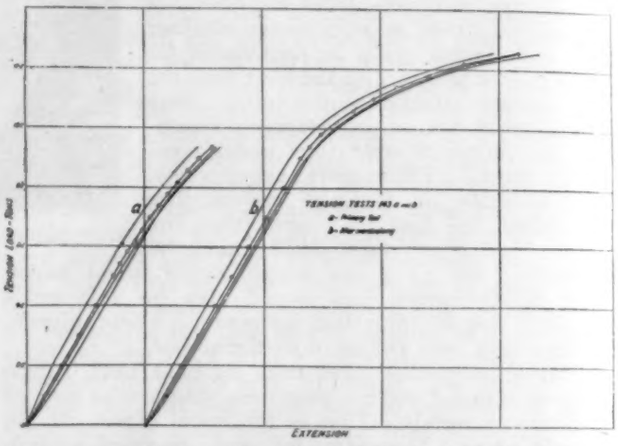


Fig. 2.—Tension Tests on Muntz Metal Specimens shows that there is a very considerable "Elastic Limit" Effect with this Material. It is made more elastic by overstrain. The smooth lines are the three stress curves obtained by the sphingometer.

that it failed at about 45 degs. with the radius of the tube. The theory of this failure has been fully worked out by the author, and it is evident from the manner in which the tube fails that it is due to shear.

It is hoped that the records given above will emphasize the fact that, at present, the only really satisfactory ductile material for tests concerning elastic failure is mild steel. All of the others either possess a very indefinite

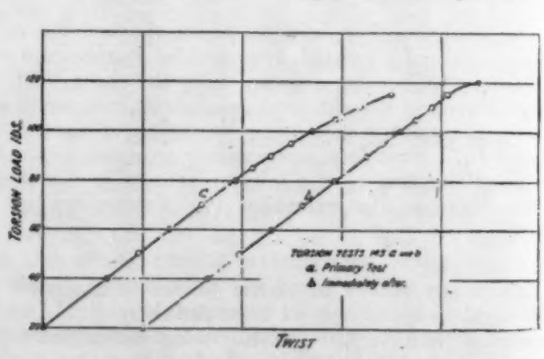


Fig. 3.—The Effect of Overstrain on Muntz Metal. Note that it makes the material more elastic.

yield-point, or else the material varies considerably in its elastic properties. It remains to be seen whether these difficulties can be overcome by the manufacturers of the many ductile materials now used in engineering work. The evidence above shows that copper fractures in a manner suggestive of Guest's Law for steel, but aluminum gives an unlooked-for fracture. It is also clear that ductile materials do not all possess exactly similar properties.

Copper tubes were kindly supplied by the kindness of Messrs. The Broughton Copper Company, Ltd. They were standard tubes of 1 in. diameter.

THE TECHNICAL ASSAY OF ZINC.*

By H. W. Greenwood and F. J. Brislee, D.Sc.

This communication represents work undertaken with a view to determining—

1. The relative value, for technical purposes, of the various analytical methods for the determination of zinc.
2. The gathering together of the more important references, in both British and foreign scientific literature, to the analytic chemistry of zinc.

The authors hope that this will be the first of a number of papers dealing with the analytical chemistry of the non-ferrous metals.

H. W. GREENWOOD.

The course which has been followed has been to examine the known methods of estimating the metal and its compounds, with a view of determining the relative accuracy of each method and also its applicability to technical work. Whenever it appeared desirable attempts have been made to modify methods, either with a view to rendering them more accurate, or to determine the conditions under which the various reactions proceeded most rapidly, or with the least interference from other elements.

As far as possible the authors have looked up the previous literature on the subject, and a list of the more important papers is appended.

1. W. H. Seaman.—"Ferrocyanide Method." *Journal of the American Chemical Society*, 1907, vol. xxix, p. 205.

2. Report of the American Sub-Committee on Zinc Ore Analysis. *Journal of the American Chemical Society*, 1907, vol. xxix. p. 262.

3. P. H. Walker.—"Volumetric Method for Zinc." *Journal of the American Chemical Society*, 1901, vol. xxiii. p. 468.

4. T. S. Price.—"Electro-deposition of Zinc, Using Rotating Electrodes." *Journal of the Society of Chemical Industry*, 1906, p. 643; also *Faraday Society Transactions*, 1907.

5. Bertrand and Javillier.—"Estimation of Zinc as Calcium Zincate." *Comptes Rendus*, 1906, vol. cxliii. p. 900.

"Schaffner Method." *Bull. Soc. Chem. Belg.*, 1906, vol. xx. p. 373; 1907, vol. xxi. p. 121.

"Delicacy of Nitro-prusside Reaction." *Zeit. f. Anal. Chim.*, 1904, vol. xliii. p. 227; 1906, vol. xiv. p. 409.

"Electrolytic Methods." *Zeit. f. Anal. Chim.*, 1906, vol. xlv. p. 174; *Zeit. f. Electro-chim.*, 1907, vol. xiii. p. 751; *Journal of the American Chemical Society*, 1907, vol. xxix. p. 1596; *Bull. Soc. Chim. Belg.*, 1906, vol. xx. p. 164.

"Critique of Processes." *Chem. Zeit.*, 1905, vol. xxix. p. 951.

In all cases the methods have been carefully checked over in the authors' laboratories.

From the beginning we did not propose to examine every known method for estimating zinc, but only those which either have been, or are applicable for technical work; in other words, methods which can be used in a works laboratory. The following are the methods which are dealt with:

(*a*) VOLUMETRIC METHODS.

1. Schaffner's, i. e. titration with sodium sulphide in an alkaline solution.
2. Titration with ferrocyanide.
3. Walker's, i. e. conversion of zinc to zinc-ammonium phosphate and subsequent titration.
4. Leison's, i. e. conversion of zinc into oxalate and titration with permanganate.

(*b*) GRAVIMETRIC METHODS.

1. Precipitation as carbonate and ignition to oxide.
2. Precipitation as zinc-ammonium phosphate and ignition to pyrophosphate.
3. Estimation of calcium zincate.
4. Indirect methods.

(*c*) ELECTROLYTIC METHODS.

Schaffner's Method.—This method depends upon the fact that in an alkaline solution zinc is precipitated by an alkaline sulphide. The method is applicable to all classes of zinc compounds; it is, however, one in which a certain amount of practice is required, and care must be taken to ensure like conditions throughout a series of essays; given those conditions, the method is capable of affording very good results, and is the one most favored by the authors as a technical method.

To sum up, the conditions under which the sodium sulphide method gives the best results are:—

1. Temperature, 60 degs. to 80 degs. C.
2. Volume, 150 to 170 cubic centimeters.
3. Absence of interfering elements.
4. Good excess of ammonia.

The method has been used by one of the authors for many hundreds of assays, and has always given reliable results. We find it advisable to re-standardize the sodium sulphide solution at intervals of two days if used constantly, otherwise it should be standardized for each batch of assays.

The Ferro-Cyanide Method.—This method is one which has received much more attention than the former, and is, to a large extent, more favored. It has been well reviewed by W. H. Seaman (1), whose work the present authors have recapitulated, and with whose conclusions they are in full agreement. The method is certainly one which admits of rapid assays being made, and that, too, with a large degree of accuracy, and in all cases where time is of importance the authors use this method. There are, however, one or two points against it, the most important of which is the end-point. In the majority of cases a solution of uranium acetate is used on a spot-plate. We find that the end-point under these conditions is not satisfactory, and that a solution of ammonium molybdate gives infinitely better results. The American Sub-Committee on the Analysis of Zinc Ores (2) proposed using a solution of ammonium tetramolybdate in the actual assay solution; as far as our experience has gone we infinitely prefer to use it on a spot-plate. Using it in this fashion a correction of 0.60 cubic centimeter is necessary, as in the Schaffner method. The molybdate indicator is nearly twice as delicate as the uranium.

Walker's Volumetric Method.—This method is an application of Stoll's for the estimation of magnesium, and was first proposed by P. H. Walker (3).

We have found the above method gives exceedingly good results on pure solutions of zinc, but, contrary to what most authorities say on the subject, we find that elements such as iron, calcium, and magnesium very seriously affect the result. Under the circumstances the method is not capable of wide application, although in isolated cases it works exceedingly well.

Gravimetric Methods.—With one or two exceptions gravimetric methods for the estimation of zinc can hardly be recommended for technical work, but there are occasions when it is very difficult to apply volumetric methods. The commonest gravimetric

*Paper read at Manchester, England, meeting of Institute of Metals held October 15, 1909.

method for zinc is precipitation as carbonate and subsequent ignition to oxide. In a large number of tests run through we found that this method gave consistently high results, mainly due to the practical impossibility of getting rid of the sodium carbonate by washing. A method which gave much more satisfactory results was the precipitation of the zinc as zinc-ammonium-phosphate and ignition to pyrophosphate.

A method which we have found very useful at times, when it has been necessary to separate small quantities of zinc in the course of an analysis, preferably as sulphide, is to add an excess of mercuric chloride, say, 0.50 gramme in solution, precipitate with ammonium sulphide, filter dry, and either ignite carefully, or burn in a current of hydrogen.

Estimation of Zinc in Brass.—The following method is one we have used in a large number of cases, and it has always given satisfaction:—

Weigh up 5 grammes and dissolve in 20 cubic centimeters nitric acid (conc.). When dissolved make up to 500 cubic centimeters and pipette out two 50 cubic centimeter lots; add 4 cubic centimeters ammonia and 5 cubic centimeters nitric acid, then electrolyze, using a current of 0.3 ampere at 2 to 2.5 volts. If stationery electrodes are used the electrolysis is best allowed to go on overnight; if, however, rotating electrodes are available, the operation should not take more than a couple of hours.

When the copper is completely deposited the electrodes are taken out, carefully washed with distilled water, and finally with alcohol, and the copper weighed; the washings are added to the solution from which the copper has been deposited and ammonium chloride, ammonia and bromine added, the iron, manganese, etc., filtered off, and the solution titrated immediately. The small quantity of lead which is sometimes present in brasses is generally deposited on the anode as lead peroxide.

Other methods that were tried out by the authors with good success are as follows:

Precipitation of Zinc as Zinc Ammonium Phosphate Ignition to Zinc Pyrophosphate.—This method involves the separation of the zinc from the metals of groups 1, 2, and 3, from the metals of its own group, and from the alkaline earth metals. For the estimation of zinc in alloys, this method serves admirably, and yields concordant and accurate results.

Calcium Zincate Method.—This is a method for detecting small quantities of zinc in relatively large bulks of solution, and serves as a method for isolating traces of zinc.

Electrolytic Methods.—A recent paper by T. S. Price (4) described a number of electrolytic methods for the determination of zinc in alloys. By employing a rotating cathode the deposit is obtained in a coherent form, and good results were obtained by the authors when using zinc solutions free from nitric acid, but they find the method too troublesome for use in technical practice, also that it does not offer any advantages over the other methods described.

The authors hope to continue this work, and to contribute further to the relative accuracy of the technical methods of analysis of non-ferrous metals.

A NEW ALUMINUM ALLOY.

The famous firm of Krupp, in Essen, Germany, have adopted the use of this new alloy in accordance with Gosmann's patent. The new aluminum alloy consists of 87 per cent. of aluminum, 8 per cent. of copper and 5 per cent. of tin.

TREASURY DECISION.

Composition Metal, Manganese and Arsen-Copper.

R. F. Lang, of New York, claimed that the above-named material should be entered free of duty under paragraph 533 as composition metal in chief value of copper and not as metals unwrought under paragraph 183. The protests were sustained as to manganese copper, but overruled as to arsen-copper.

United States General Appraiser Fischer says in his report:

These protests involve the assessment of duty on certain ingots of alloy metal. The invoices describe the goods (1) as manganese metal and (2) as arsen-copper. These metals are made up of the following components in the proportions stated:

Manganese-copper.—Copper, 70 per cent.; ferro-manganese, 30 per cent.

Arsen-copper.—Copper, 5 per cent.; arsenic, 45 per cent.

The proof offered as to the arsenical copper shows that alloy is not in chief value of copper. We regard the collector's assessment thereon as proper and hold its classification under paragraph 183 to be correct. As to the manganese copper, it appears that in the fusing of the ferromanganese and the copper about 5 per cent. of the iron is lost in the manufacture of the alloy, and that in its imported form the alloy contains from 25 to 30 per cent. of manganese and from 2 to 4 per cent. of iron. This quality of manganese copper is invoiced at about 1.50 marks per kilo or less, and we find from the proof offered that it is in chief value of copper. It is a metal in the form of an alloy, used solely as a raw material and the provision for "all composition metal of which copper is a component material of chief value," in paragraph 533, supplies a more specific designation for the said metal alloy than paragraph 183, as assessed.

COMPOSITION METAL, NOT BRASS.

The Board of United States General Appraisers has decided a controversy between F. B. Vandergrift & Co., New York, and the Government regarding the classification of pigs of composition metal in favor of the latter. Copper and lead are the chief elements in this metal on which duty was assessed at the rate of 45 per cent. under the provision in the Dingley tariff for a manufactured article composed wholly of metal. The importers maintained that the pigs were free of duty as "brass," or else entitled to enter as "metals unwrought" at 20 per cent. It was shown at the trial of the case that the metal contained 65.39 per cent. of copper and 28.40 per cent. of lead.

General Appraiser Fischer, in his decision for the board, says that the tribunal is of the opinion that an alloy of this character, containing so large a proportion of lead, is not, in fact, the commercial article known as brass, and for which provision is made in paragraph 505. Neither is the board inclined to uphold the importers' claim for a 20 per cent. duty as "unwrought metals." In overruling the protests, Mr. Fischer says in part:

"These composition metals are not brasses, and we hold that an alloy of copper containing over 28 per cent. of lead is likewise not a brass. In its imported condition the article is a metal in the form of an alloy used solely as a raw material to make bearings and various forms of castings. We do not regard this metal dutiable properly as assessed. We are inclined to the belief that the provision for 'all composite metal of which copper is the component material of chief value,' to which the protest makes no reference, supplies a more specific designation for this metal alloy than paragraphs 183 or 193."

THE COPPER-ZINC ALLOYS.*

A Study of the Volume Changes of Brasses During Solidification.

By Professor T. Turner, M.Sc., and M. Thornton Murray, M.Sc. (Recently Bowen Research Scholar in the University of Birmingham).

This paper describes a method for determing the volume changes of brasses during solidification. This introduction to the paper which is in reality a summary of the results of the investigation was written by Professor T. Turner and is reproduced here:

During the past few years a series of researches have been conducted in the Metallurgical Department of the University of Birmingham on the volume changes which take place in metals at temperatures from the melting-pot to that of the atmosphere.

The following is a brief summary of the results of the investigation:

1. Of the common metals in the pure state, a few (among them antimony, and zinc, and aluminum) expand on solidification. Others (including lead, tin, copper, and bismuth) do not expand on solidification. All these metals, after total solidification, contract in the mold at a uniformly decreasing rate until they reach the temperature of the air.

THOMAS TURNER, M.Sc.

2. Of the brasses, where a simple solid solution exists, the curve of maximum expansion follows the "solidus," when the "liquidus" curve is taken as the base line. So far as the authors have gone in other directions, this law is borne out for all alloys. In the brasses minima on the expansion curve occur at 100 per cent. copper, 60 per cent. copper, and 40 per cent. copper, while the curve descends to a low figure at 9 per cent. copper, and falls very little from there to 0 per cent. copper. Maxima appear at about 80 per cent. copper (large), 50 per cent. copper (small), and 14.76 per cent. copper (extraordinarily large).

3. The total shrinkage of the brasses (first investigated by Turner and Simpson, and confirmed by the present authors) show minima at about 72 per cent. copper, 58 per cent. copper, and somewhat below 20 per cent. copper, while maxima appear at 65 per cent. copper and 40 per cent. copper, of which the maximum at 40 per cent. copper is the greater. This maximum coincides with the point C on Shepherd's diagram.

4. The hardness curve of the brasses (by both scleroscope and Brinell methods) gives maxima at 78-80 per cent. copper, 55 per cent. copper, 40 per cent. copper (very great), and 9 per cent. copper. Minima are at 100 per cent. copper, 70 per cent. copper, 52 per cent. copper, 15 per cent. copper, and 0 per cent. copper. The relations of this curve to the equilibrium diagram have been discussed.

5. Finally, with regard to the brasses, the experiments carried out have led the authors to a result similar to that arrived at by W. Guertler, viz. that a compound exists at 40 per cent. (or, more accurately, 39.36 per cent. copper, and 60.64 per cent. zinc), the alloy of this composition being designated by the letter gamma by Shepherd, and called a solid solution.

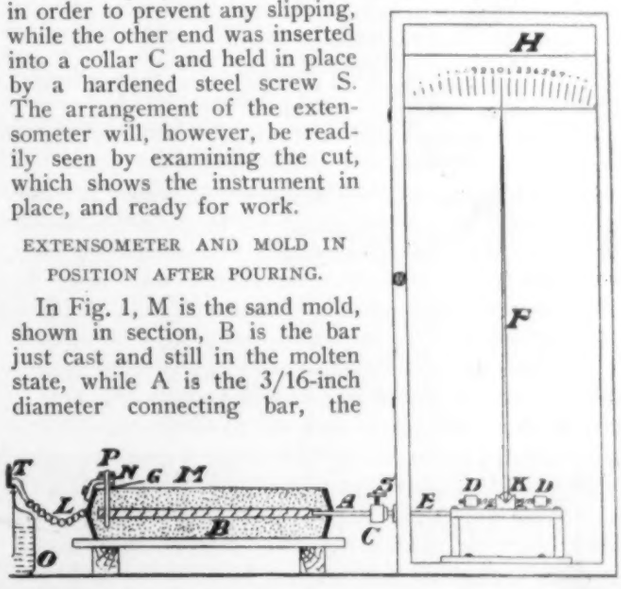
The existence of the other numerous compounds set forth by Tafel have not been confirmed by these experiments, while if the 40 per cent. copper brass be considered as a compound, the theories of Kurnakow and Shemtschushny have been, in the main, substantiated.

The paper itself, which is a classical thesis on the subject, profusely illustrated with diagrams of cooling curves and microphotographs, is too long to admit of publication here. We simply give a brief description of some of the instruments and tests employed.

THE EXTENSOMETER.

The instruments actually used for determining the volume changes in the brasses was a similar machine to that used by Professor Turner.† As that instrument was in use at the time of the author's research, a new one (Fig. 1) was devised, with some improvements, and constructed in the mechanical section of the Metallurgical Department.

In place of the tapered nail or bar used for connecting the older instrument with the mold, a length 3/16-inch iron wire was used. This was allowed to project into the mold about half an inch, and the sand made up loosely around it, so as to prevent leakage of metal from the mold, and, at the same time, avoid unnecessary friction. The portion of the connecting bar which projected into the mold was slightly burred, in order to prevent any slipping, while the other end was inserted into a collar C and held in place by a hardened steel screw S. The arrangement of the extensometer will, however, be readily seen by examining the cut, which shows the instrument in place, and ready for work.



EXTENSOMETER AND MOLD IN POSITION AFTER POURING.

In Fig. 1, M is the sand mold, shown in section, B is the bar just cast and still in the molten state, while A is the 3/16-inch diameter connecting bar, the burred end of which projects about half an inch into the metal. The pin, P, which is held in place by a nut and bolt, N, projects through the bar about an inch. A portion of the cold-junction, O, which is provided with a thermometer, T, and from which the insulated platinum and platinum-iridium wires, L, are brought, is shown on the extreme left of the diagram. The metal is poured in at the gate, G, which in the

* Abstract of a paper read at Manchester, England, meeting of Institute of Metals, held Oct. 15, 1909.

†Journal of the Iron and Steel Institute, 1906, No. 1, pp. 48-74.

figure is behind the pin, P. The mold and connecting bar are joined up to the extensometer by means of the collar, C, into which the steel screw, S, is inserted. The bar, E, which is screwed into the back of the collar, C, gives the motion to the lower end of the pointer, F, which swings about the knife-edges, K. D, D are movable balancing weights, provided to enable the pointer to be set at any position on the scale, H. The apparatus is enclosed in a wooden case, with a hinged, glazed door.

THE HARDNESS OF THE BRASSES.

The tests for hardness were conducted in conjunction with the shrinkage tests as follows: A number of specimens were cut from the bars cast in the foregoing research and tested for hardness by two methods:—

1. The Shore Scleroscope.—This instrument, invented by Mr. Shore, of the United States of America, depends upon the fact that by allowing a "hammer" or weight with a very hard, sharp point to fall point down upon the specimen to be tested the equivalent of a very great blow can be obtained, without any danger of fracture entering into consideration, and the "hardness" of the specimen can be tested by the height to which the hammer rebounds. It is contended that elasticity does not enter into the test if the specimen is large enough, and is held on a flat, firm base. Somewhat disquieting results have been obtained when using substances such as wood or india-rubber, but for a number of tests upon similar metals the instruments have given satisfactory results, which are not incompatible with other tests obtained by different methods.*

2. The Brinell Test.†—This test, which depends on the impressions produced by forcing a hard steel sphere into the specimen under test, and the subsequent measurement of the spherical area of that impression, is too well known to need elaboration here. It is unsuitable for a particularly hard and brittle specimen (such as a 40 per cent. copper-brass), but is otherwise quite reliable.

Below is given a table showing the hardness of two brasses as tested by the two methods:—

TABLE II.—HARDNESS OF BRASSES. ½-INCH CAST BAR.

Reference Number of Bar.	Copper Per Cent.	Hardness (Scleroscope).	Hardness (Brinell).	Brinell Hardiness. 6
1	0.00	8.0	33.50	5.6
3	1.50	10.0	58.00	9.7
4	69.20	9.0	57.00	9.5
5	60.14	11.0	89.20	14.8
7	51.10	11.5	114.50	19.1
8	45.10	28.0	247.00	41.0
9	35.60	42.0	....	...
10	26.60	31.0	180.00	30.0
11	17.35	9.0	71.50	11.9
12	78.00	11.5	77.80	13.0
13	89.00	6.5	55.80	9.3
14	98.00	....	47.90	8.0
15	9.20	12.0	93.70	15.6
16	100.00	4.5	47.50	7.9
17	81.50	11.0	58.00	9.6
18	49.50	17.0	170.00	28.3
19	93.20	5.0	51.60	8.6
20	54.10	13.0	127.90	21.3
21	40.00	50.0	....	....
22	14.40	9.0	41.20	6.9
23	12.50	9.0	47.70	8.0
25	13.05	8.0	47.00	7.8
26	14.76	8.5	48.00	8.0

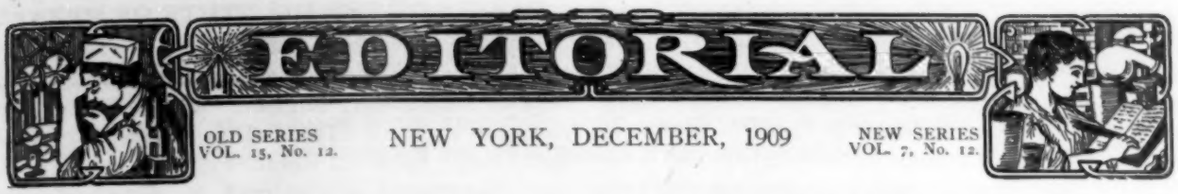
*Professor T. Turner, Journal of the Iron and Steel Institute, 1909, No. I. p. 426.
†Wahlberg (Stockholm), Journal of the Iron and Steel Institute, 1901, No. I. p. 243.

At the conclusion of the paper Professor Turner gives some interesting notes on shrinkage as follows:

"Shrinkage may be defined as the difference between the length of a casting and that of the pattern from which it has been produced. In other words, it is the difference in volume between the fluid metal in the mold and the resulting casting when at the ordinary temperature. If, for example, a pattern of a bar is 12 inches long, and the casting 11.85 inches, the shrinkage is 0.15 inch, or 1.25 per cent. The term has been used by some American writers in a different sense, but it is more generally employed in the above manner. Shrinkage, therefore, does not take into account the various stages of contraction, arrests, or actual expansions which may occur, but deals merely with the final result, or algebraic sum, of the volume change.

Ironfounders frequently experience loss and inconvenience from warped or broken castings due to irregular or excessive shrinkage. One common trouble is the cracking of a casting either during or after cooling. Three chief causes contribute to this effect—namely, that hard metal usually shrinks more than soft; that thin castings shrink more than thick ones; and that in most soft irons marked expansions occur at certain definite temperatures. The brassfounder is not free from similar troubles, though he does not suffer to the same extent.

Some years ago I was consulted by a firm of brass founders who were frequently troubled by grids and similar castings cracking in the mold. I assumed that the thin parts contracted more than the thick ones, and suggested that wherever possible uniform sections should be used, and a 70 : 30 mixture employed on account of its greater ductility. I heard later that the change led to better results, but the good advice was based on a false assumption. Actual experiments at the works, confirmed in my laboratory, showed that thin copper or brass castings do not contract more than thick ones, and indeed in some instances the opposite is the case. Mr. Simpson's tests, confirmed by Mr. Murray, show that in the copper-zinc alloys with from 100 per cent. copper to about 70 per cent. thick and thin bars behave practically alike. In other words, there is no chilling effect due to rapid cooling. The same is true with about 60 per cent. of copper, and also with from 40 to 10 per cent. On the other hand, alloys in the neighborhood of 65 per cent. of copper, and also those with about 50 per cent. of copper, shrink less in thin bars than in thick ones; or, in other words, behave in a manner which is exactly opposite to that of cast iron. A glance at the equilibrium diagram will show that with between 45 and 70 per cent. of copper the B phase is more stable at high than at lower temperatures, and the abnormal effects observed in the shrinkage tests are doubtless due to the varying proportions of B obtained by the relatively rapid or slow cooling. The number of experiments made on this part of the subject is not sufficient to fully map out the curve, and the inquiry is one which might readily and with advantage be more completely investigated by those practically interested in brass casting."



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THE METAL INDUSTRY

THE CONSOLIDATION OF

THE ALUMINUM WORLD
THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS' REVIEW
COPPER AND BRASS

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CONTENTS

COPPER CONSOLIDATION CONJECTURE.

As we go to press there are still in the air all sorts of rumors of a copper consolidation, but so far as anyone outside of the principals themselves knows, one guess is as good as another. The most prevalent guess seems to settle on a holding company with a capital of preferred and common stock. This company will probably include the Cole-Ryan interests in Montana and Mexico. The properties dominated by the Guggenheim and the Lewisohn interests in Nevada, Arizona, Utah, and the Amalgamated properties. The Lake companies naturally would not be included in any such combination, owing to Michigan law, which is inimical to trusts. The Phelps-Dodge interests, it is strongly rumored would be drawn in, but inquiry at the offices elicited nothing more than "No opinions and no thoughts." The copper mining interests of J. P. Morgan & Company would probably be absorbed, and very likely Boston Consolidated as well. Among the selling companies mentioned in this connection are the United Metals Selling Company and the International Smelting and Refining Company, with possibly the American Smelters' Securities Company and the American Smelting and Refining Company, though they would make a very expensive addition to the investment.

Whether the measure decided upon takes the form of a merger or a community of interests, it is reported that a plan would undoubtedly be formulated which could be counted upon to balance the market.

The new combination is expected to control a large percentage of the copper production of North America, which practically means of the world, and by a curtailment of output on its own account raise the price of copper to such an extent as to enable it to pay dividends on its stock plus previous and future capitalization. Incidentally a good many securities of doubtful value to present holders would be put on a marketable basis.

It is difficult to prophesy just how a price agreement can be maintained in the face of the large independent interests which perforce must be left out of consolidation. This result could, however, be accomplished by a "gentlemen's agreement," the mention of which may make some people smile. Again "Carnegie tactics" could and probably would be adopted in depressing the price in prosperous times and raising it again as soon as independent companies had contracted for their output.

However, all this is conjecture,, and we can only wait and let time tell the story. At present matters seem to be at a standstill, pending the recent decision for the United States Government in the Standard Oil suit, and we understand that conferences are now taking place in Washington. While the Standard Oil suit will have an

effect upon most all of the copper shares through the intimate connection of the Standard Oil financiers with the copper merger, and the development of copper properties throughout the country generally, there are many other stocks that stand in danger of similar treatment by the Government if the decision against the Standard is upheld in the higher courts. Among the concerns which are affected in one way or another by the outcome of the suit, when it is finally decided in the court of last appeal, are the Diamond Match Company, the United States Steel Company, American Brass Company, United Boxboard and Paper Company and National Biscuit Company.

While all this speculation is going on as to "who's who" in the consolidation of copper interests that is supposed to be in process of formation, it might be well to look at the question from the consumer's standpoint. It does not look as though there need be any cause for worry in the hint of a maintenance of standard prices. On the contrary such a condition of affairs would undoubtedly be welcomed by the majority of users of the metal.

A standard price of 14, or even 15 cents per pound for refined copper would certainly put the brass business on a healthy basis, and a consumer would have no hesitancy in carrying a stock for his future needs. On the other hand such a standard price would enable low grade propositions to be profitably worked and thereby add to the production. With the production in excess of consumption, and increasing as it has been every month since the statistics of the copper producers have been published; as for instance September showed an increase in stocks on hand of 12,600,000 pounds, October of 15,840,000 pounds, and November of 2,036,000 pounds, but the total stocks held by producers on November 1 were 153,509,626 pounds, as compared with 122,596,607 pounds on August 1, it is evident that some expedient is needed to equalize conditions. An increase of 30,700,000 pounds in this country alone, in a period of three months is something to think about. In the face of these figures it does not seem as though there need be any worry over copper supply, and on the other hand if production is curtailed as suggested by a combination, there is nothing to prevent the working of low grade propositions during a period of 14 or 15 cent copper. A recent trip through the principal brass producing district of this country, viz.: Connecticut, disclosed the fact that the largest consumers were "resting on their oars," so to speak, and buying copper actually from hand to mouth. Concerns that ordinarily would carry a stock of several million pounds had merely enough for a few days, or at the most a week or two supply. This only goes to show how difficult it is to apply the law of supply and demand to the question of copper.

So far the only tangible effect on business in general, of the impending consolidation has been to furnish Wall street speculators additional grounds on which to juggle with copper stocks. These operations have naturally reacted on the price of the metal and caused consumers to pursue a waiting policy. We are not surprised, even with mills running overtime in the brass industry, to see a continual increase in the amount of copper on hand in the production statement for November.

PAPERS OF THE INSTITUTE OF METALS.

Last month we published two of the papers read at the October 15 meeting of the Institute of Metals held at Manchester, England. These papers, "Notes on Some Probable Causes of the Corrosion of Copper and Brass," by E. L. Rhead, F. T. C., and "The Surface Appearance of Solders," by C. O. Bannister, A. R. S. M., and H. T. Tabor, we considered of sufficient interest to our readers to publish entire. We follow up Professor Rhead's paper by its discussion in this number of THE METAL INDUSTRY and also give abstracts from three other important papers read at the same meeting.

These papers are "The Copper-Zinc Alloys; a Study of the Volume Changes of Brasses During Solidification," by Professor Thomas Turner, M. Sc., and M. Thornton Murray, M. Sc.; "The Elastic Breakdown of the Non-Ferrous Metals," by C. Alfred M. Smith, and "The Technical Assay of Zinc," by H. W. Greenwood and F. T. Brislee, D. S. C. The first two papers mentioned are profusely illustrated with diagrams and microphotographs and are really classic theses of their kind. All these papers make valuable additions to the literature of the non-ferrous metals hitherto woefully meager in extent. In January comes the annual meeting of the Institute of Metals to be held in London and this meeting will mark the close of the first year of its life. At this meeting it is expected there will be presented a number of papers bearing on the more practical side of the handling of the non-ferrous metals. These new papers, together with those just read and those to be presented at the coming convention of The American Brass Founders' Association to be held in Detroit in June, 1910, will make a most valuable collection and should be included in everyone's library. Complete copies of all the Institute of Metals' papers may be obtained, while they last, free by addressing the secretary of the Institute, G. Shaw Scott, Caxton House, Westminster, S. W., London, England.

NEW BOOKS

METALLIC ALLOYS: Their Structure and Constitution. By G. H. Gulliver, B. Sc., F.R.S.E., A.M.I. Mech. E., Lecturer in Engineering in the University of Edinburgh. Size, 5¾ x 8 ins.; 254 pages; 104 illustrations. Price, $2. J. B. Lippincott Company, Philadelphia, Pa.; Chas. Griffin & Company, Ltd., London, England.

This book has grown out of a course of lectures on Alloys, delivered in the Engineering Department of the University of Edinburgh during the last two winter sessions, and it represents an attempt to present the Theory of Alloys on a systematic basis. Certain parts of the book are believed to be entirely new in that it contains information previously unpublished, and in this respect the author hopes that it will prove useful not only to teachers and students of metallurgy, but also to that large class of engineers which depends largely for its existence upon the manufacture of alloys of one kind or another. The book contains eight chapters and treats of the preparation of specimens for microscopic examinations, the solution theory and the chemical equilibrium of mixed substances, primary alloys in which no definite chemical compounds are formed, primary alloys which show evidence of the formation of definite chemical compounds, and alloys of more than two metals.

The portion diverted to brasses and bronzes is profusely illustrated, with equilibrium diagrams and microphotographs of the various alloys of tin, copper and zinc.

For sale by THE METAL INDUSTRY.

FURNACE RECOMMENDATIONS.

To The Editor of The Metal Industry:

On the front cover of the November issue of The Metal Industry I note a quotation from some remarks I was responsible for while attending a session of the Brass Foundrymen's Association convention at Cincinnati, Ohio, last May, in which the Hawley Down Draft Furnace Company, as part of their advertisement in featuring the Schwartz furnaces, credit me with the following assertion: "We have had the Schwartz furnace for six years. The Schwartz possesses facility in handling and getting out big heats and getting them out quickly, and in that line nothing on the face of the earth can touch it," and that I said it is undeniably true; but while this furnace is all that I have claimed for it, I would not for a minute use it for making castings which must meet specific requirements as to color and correct proportion. When the conditions are severe my advice to any would-be buyers of oil-burning furnaces is to select the kind which uses a crucible, either tilting or stationary, and I would further advise that if you want to prolong the life of the crucible select the type that uses the lowest air pressure, such, for instance, as the tilting furnace built by the Rockwell Furnace Company, which I have found to work beautifully on mixtures that must be right.

Incidentally, I propose to be very careful in the future as to what remarks I may make on the furnace question at the conventions, as while the printed record of the discussions there is supposed to be public property, yet it would seem that the parties using a portion of one's remarks, which is favorable to their product, might at least ask the Brass Foundrymen's Association or the speaker who addressed the body for permission to use same as an advertisement.

William H. Parry.

Brooklyn, N. Y., Nov. 15, 1909.

TESTING OLD NICKEL PLATING SOLUTIONS.

To the Editor of The Metal Industry.

I have read with considerable interest the article entitled "A Color Method of Analyzing Old Nickel Plating Solutions," appearing on page 373 of the October issue of your magazine, and I heartily agree with the author, Mr. S. R. Mason, regarding the inadequacy of a hydrometer for maintaining nickel plating solutions, but I do not think that his method will prove satisfactory as outlined.

In the first place, the addition of double nickel salt with a view to increasing the nickel content, will obviously cause too great an increase in the density of the electrolyte and will not increase the nickel content in the proper degree. If the simple outline suggested by Mr. Mason were followed he would soon obtain a solution of too high a density, owing to the continued addition of ammonium salts. The proper salt to use is the single nickel salt (nickel sulphate), as by its use the nickel content would be appreciably increased, and, although the density would be increased, the increase would be materially less than if the double nickel salt were added.

As a rule the plater desires to maintain a solution within close limits of density, as by so doing he can keep this voltage and amperage approximately the same from one day to the next. He also attempts to keep his solution as nearly free from acid (sulphuric acid) or alkaline tendencies as possible. In order to keep the solution as nearly constant as possible regarding its density, acidity, etc., and to maintain an average nickel content, it is obvious that it would be necessary to vary the additions of nickel salt, water, etc., according to the requirements of the solution. For this reason formulas would be necessary for replenishing under the following conditions:

Low density and normal color,
Low density and low color,
Low density and high color,
High density and normal color,
High density and high color,
High density and low color.

The question of control of the nickel plating solution under these varied conditions is not as difficult as would appear at first glance, the preliminary figuring requiring considerable time, but the actual control being a simple matter. An experienced plater would by experiment obtain satisfactory standards under all six headings and could determine at a glance after using his hydrometer under what heading his solution stood. By making up a set of standard solutions and putting them in clear glass tubes he could readily determine the exact position which his solution represented. Simple reference to his tables would then show him just what it would be necessary to add to bring his solution back to normal conditions. I believe that a table of this character would prove of advantage to the plater and will probably work one out for experimental purposes. Such a means of determining the quality of the plating solution could not, however, be classed as analytical, nor is it necessary to obtain absolutely accurate results.

In chemistry we have not yet adopted the color method of determining nickel, as suggested by Mr. Mason, although it is found satisfactory for many other chemical analyses, and for this reason I think that he has inadvisedly named his subject. The idea of checking nickel solutions by color comparison has been suggested a number of times, but up to date it does not seem to have been adopted or to have attracted very much attention, simply for the reason that it is open to just the criticisms which I have made. By proper modifications and careful standardizing the method could be adapted to any kind of nickel solution.

Percy S. Brown.

New York, November 26, 1909.

MUNTZ'S METAL COMPANY'S LABORATORY.

To the Editor of The Metal Industry:

In your notice of the Institute of Metals, it is stated that Sir Gerard Muntz was the creator of Muntz's Metal Company's Laboratory.

On Nov. 21, 1899, Mr. Gerard Muntz, as he was at that time, gave me a testimonial, which contains the following: "Mr. Ernest Lewis has had sole control of the laboratory and has practically created our chemical department and had control of the elaboration and completion of the apparatus under his control."

The original of this letter is in my possession.

Ernest A. Lewis.

Birmingham, Nov. 21, 1909.

The statement that Mr. Lewis takes exception to, was contained in the report published in the November Metal Industry, of the Manchester, England, meeting of the Institute of Metals, held Oct. 15, 1909.

The sketch of Sir Gerard Muntz, Bart., in which the statement occurs, was taken from the official programme of the meeting.—Ed.

CARELESS CYANIDE HANDLING.

To the Editor of The Metal Industry:

I have yours of 16th relative to the article on Workshop Ventilations, in The Metal Industry for November, and have no criticism to offer, but fully commend it. It is a matter for more serious steps than is generally recognized and any steps that will tend to an improvement in this respect should have generous support.

I believe that an effort should be made first of all, to bring foreman to a full realization of the danger of fumes from cyanide solutions (heated ones in particular, as well as cold solutions where very high current density is used) as well as contact with the skin. While recognized as poisonous, with a large number it is only in a general way, and with many a matter of indifference. They "have done it for years and are living yet" therefore the danger is slight.

Several severe cases have come to my notice recently which proper ventilation would have avoided. One case in particular where large work was bright dipped by hand (immersed in dip and with no exhaust fan), later cyanide dipped in same way, then washed up in cyanide with a brush, all with the naked hand. It was a line on which little had been done, so save for staining from acid, no harm had yet been noticed; but it is a good example of what often is done. H. H. MEYERS.

Bridgeport, Conn., Nov. 17, 1909.

ELECTRO-GALVANIZING SOLUTION.

To the Editor of THE METAL INDUSTRY:

It is with interest I read in the September of THE METAL INDUSTRY the letter addressed to you by Alfred Sang. It is true that I owe an apology to your readers for my erroneous statement in suggesting that zinc anodes were not necessary to keep the electrolyte in good working order, as I should have stated they are not absolutely necessary for that purpose alone. They are, however, absolutely necessary in the solution itself. This criticism is, however, of minor importance. Your correspondent seems to seriously question my veracity in suggesting the solution I do. The process I have suggested is as I have stated, far superior to any I have tried or known, and has, in my experience as a practical plater always brought about the very best results. I have given it to the trade for what it is worth. If this "Pioneer" process, is as old as the art itself to our friend it is new to me and I dare say to the average plater.

In regard to the chemicals, glue and glucose which were inadvertently called reagents. I do not contend that they are necessary in the solution but I do know that if a bright luster is desired it can be obtained by using the chemicals mentioned in the manner I suggest. As stated the E. M. F. which was made to read 10 amperes to a square foot of surface was incorrect, this of course should be that a current of 10 amperes was necessary for this solution. WM. SCHNEIDER.

New York, Dec. 4, 1909.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

ALLOYING

Q.—Please give us a mixture of hydraulic metal for hydraulic valves, to stand a working pressure of 4,000 pounds pressure.

A.—The following mixture ought to prove satisfactory for your work:

Copper	100
Tin	10
Sheet yellow brass	25

For very high pressure valves, manganese bronze has been used with considerable success.—J. L. J.

BRIGHTENING

Q.—I have tried to use benzol for bright plating in place of carbon bisulphide, but it does not work well. Please publish a receipt for this.

A.—Benzol gives good results unless a very bright deposit is required, then a mixture of bisulphide of carbon in a concentrated solution of potassium cyanide is better than anything. Dissolve 1 lb. of cyanide in 1 qt. of warm water, then add all the bisulphide of carbon it will absorb; this will amount to 3 or 4 ozs.; use only the clear solution. Any undissolved carbon should not be added. A teaspoonful to 25 gals. will be found ample.—C. H. P.

CASTING

Q.—We beg to say that we are desirous of making knobs of white metal by running the metal into molds similar in shape to walking stick handles. We have much difficulty in getting the articles sound, as small pin holes appear on the surface. We should be glad to know if you could inform us by what means we could prevent this and oblige.

A.—Your trouble in getting sound white metal castings may be due to the alloy used or it may be due to your method of gating. A fluid metal that will run sharp and clean should be used. Such a metal is found in the mixture composed of:—

Refined lead	87 lbs.
Cookson's Antimony	13 "

If antimonial lead is used there is often enough arsenic in it to prevent free running and give unsound castings. Covering your metal, over night, with wood ashes helps to purify it. If your castings contain any angles, curves or corners that prevent the air escaping through the gate while pouring, you will have to arrange air vents to allow it to escape.—J. L. J.

Q.—Would like to know what to cast such articles as shown in enclosed cut out of. They are to be gold plated when finished.

A.—Articles such as you send us designs of are usually made from the alloy known as antimonial lead. The method of producing them is to first prepare models in plaster. Plaster molds are made from the plaster models, which are then used as pattern molds cast in low brass or bronze; the molds are then

ARTICLE CAST FROM ANTIMONIAL LEAD.

chased by the die worker to bring out the details and line work. If the articles are to show the detail on one side only and the back perfectly smooth, then what is known as one piece molds are used; the back of the mold is protected with a perfectly smooth piece of wood, to which is fastened a piece of heavy manilla paper. This when smoked acts as the back of the mold. Antimonial lead is used on account of the sharpness of detail that can be brought out by its use and the low melting temperature of the alloy. All the fancy metal blocks, toilet articles and art metal goods are produced by this metal either in what is known as solid or slush molds.—C. H. P.

CASTING

Q.—Kindly publish the best formula for aluminum automobile casting, and also a formula for soap die casting. We want a cheap metal that will not bend and still be hard to break.

A.—The best light aluminum alloy is composed of:

Copper	7%
Aluminum	93%

The results that may be obtained from this alloy and other similar alloys depend on how they are handled. Some shapes can only be made by using aluminum or copper chills or by casting in iron molds. In molding where feebly alkaline or acid liquids are used, block tin is a very good material. It is expensive, however, and bends easily. Perhaps the best "all round" metal for die work may be said to be "Monel Metal" and we would recommend you to investigate its merits.—J. L. J.

COATING

Q.—Can you give us the mixture of white metal that is used on knives, spoons and forks before silver plating, and which shows a silver color after the plate has worn off?

A.—The majority of such work is coated with a solder mixture consisting of 75 parts tin and 25 parts lead, or the common half and half mixture which is 50 parts tin and 50 parts lead. The surface is cleaned in the regular manner, then a flux is used consisting of solution of chloride of zinc (the regular soldering fluid). The articles are then immersed in the molten metal, upon the top of which to the depth of one inch, tallow or cocoanut oil is placed. This prevents oxidation and also acts as a flux, giving a lighter and smoother tinned surface. After tinning the surface is smoothed down with the regular methods and prepared in the usual manner for silver plating.—C. H. P.

DISSOLVING

Q.—I have some Bayberry wax and I want to make a sort of paint to put on patterns with a brush. Please let me know how to make the paint so as to keep the wax liquid.

A.—Turpentine is the natural solvent for most waxes. Dissolve the Bayberry wax by the aid of heat, using sufficient temperature for solution. A small amount of linseed oil added might prove an advantage.—C. H. P.

FINISHING

Q.—How is a smoky or cloudy finish produced on brass and silver?

A.—The smoke or cloudy finish is produced upon brass, copper or silver to give the antique effect, by first producing an old brass, copper or Butler silver tone by scouring with a tampico wheel, using pulverized flint, silex or pumice stone. The articles are then washed and dried out in the usual manner, then varnished in the same manner as lacquering, using No. 1 extra turpentine copal varnish; this can be thinned with the best spirits of turpentine. The articles are allowed to dry for at least 24 hours in a room perfectly free from dust, then with suitable holders, so that it is possible to revolve the articles readily. They are placed above a gas flame that burns steadily. By manipulation the articles can be shaded from the center towards the base from an olive green to a black. After the finish is accomplished the articles are allowed to dry until sufficiently hard. The operator should use smoked eye glasses in performing these operations to protect the eyes, on account of the close proximity to the light. This method could possibly be accomplished more satisfactorily in a darkened room.—C. H. P.

FLUXING

Q.—Can you suggest any fluxing material that will neutralize the injurious effects of arsenic contained in antimonial lead. We use antimonial lead in making low grade bearing metals and the antimonials running high in arsenic make poor flowing alloys. We would like to overcome this defect.

A.—Arsenic and other impurities may be removed from antimonial lead by poling and the use of a flux composed of soda ash, sulphate of soda, charcoal, oxidized antimony ore and a little common salt. This refining is usually done on a large scale and it is not advisable to attempt it in a small way, using crucibles. Refined antimonial lead from which this arsenic has been more or less removed may be obtained from several manufacturers, under the same of "antimonial alloy."—J. L. J.

HARDENING

Q.—We want a receipt for case-hardening small pieces of steel. A process that will harden and at the same time make them tough and "springy."

A.—We gather from your letter that you have to produce some of your product at a low cost and that the selling price will not permit you to use high grade crucible spring steel, but that you want to use common steel and practically turn it into spring steel by case-hardening. We doubt if you can do this because of the impurities in the steel, the difficulty of case-hardening articles uniformly and the danger of burning the steel if any air at all gets at it.

However, we advise you to get some "Ingot iron" from the American Rolling Mill Company, Middletown, Ohio, and try it out, for it is as pure as the best Swedish iron. Use all the precautions possible to secure a uniform case-hardening and keep the air away from the pieces treated while they are red hot. The case-hardening must not be carried any further than is necessary to make the steel tough and springy. If carried too far it will make the steel brittle, even if the air is kept from it.—J. L. J.

PLATING

Q.—We are having trouble with our silver anodes, which turn black. They are the same ones which kept white when the solution was in good order.

A.—The trouble with your silver solution is that it evidently contains too much silver chloride, and the remedy will be to add some cyanide of potash. Try adding at the rate of ½ ounce of cyanide for each gallon of solution. You will always find that when a silver anode turns dark, or black, while working that there is not enough cyanide in the bath; if the anode, on the other hand, should turn green, it would indicate that there was copper in the anode, and in this case the anode should be discarded.

As your anode has worked right, this supposition as to copper cannot be true, so your trouble must come from too little cyanide. The original tank solution should contain 3 ounces of silver converted into cyanide, and 6 ounces of potassium cyanide per gallon of solution. In case this method of correction does not set you straight, we should advise proceeding in the following manner: Add common salt to the solution with a very small quantity of muriatic acid until the precipitate ceases to form, wash this precipitate with clear water until the washings fail to give a cloud, when tested in a glass with a drop or two of silver nitrate solution; the precipitated silver chloride can then be dissolved by the ecess of cyanide of potish, and used for a new bath.—C. H. P.

REFINING

Q.—Will you kindly inform me how an alloy manufactured as per the following formula, can be refined without much dross accumulating on the pot or ladle in which it is melted and if it is possible to get a metal manufactured to this formula to turn out with a perfectly white surface? If it is possible kindly explain how to do it. The writer's experience has been that at no matter what heat this metal is poured there is always a bluish tinge on the surface.

Formula:

Tin	50%
Zinc	25%
Antimony	25%

If it is necessary to use a special flux for this metal kindly state what flux is necessary.

A.—If it is desired to keep the alloy mentioned free from dross it should be made from pure antimony, tin and zinc, melted in a graphite crucible and stirred with a graphite stirring bar. In pouring it into ingots, hold lip of crucible close to mold and pour so that as little air as possible will be carried down with the molten metal, as this will make the ingot drossy. The bluish tinge can generally be removed by throwing a little sal ammoniac on the molds before the metal sets.—J. L. J.

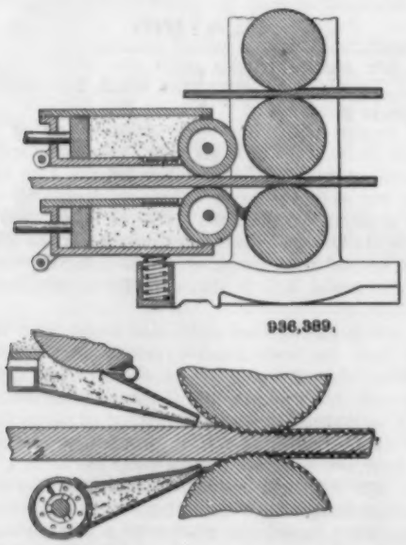
PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

936,389. October 12, 1909. METHOD OF TREATING METAL. Frank L. O. Wadsworth, Sewickley, Penna.

A method for forming a dense protective coating or skin of substantial thickness on the surface of metal articles. This skin or coating is produced by increasing the superficial area of the metal by forming projections on or depressions in the surfaces of the metal preferably during the shaping of the metal, chilling the surfaces of the projections or depressions and finally forcing the chilled walls of the projections or depressions into a common plane, or in other words decreasing the superficial area of the article. The skin thus produced is due, it is thought, to a structural or physical change in the molecules and not in any material degree to any chemical change.

This invention has for its object the production of both a physical and a chemical change in the character of the metal



936,389.

forming the skin, by combining or alloying with such metal, a material or materials, which will so change or modify the metal composing the skin as to impart improved resistant qualities to the surface without detrimentally affecting the physical change produced by the mechanical treatment of the metal.

The process can be conveniently carried out while reducing the metal by rolling between rolls having passes shaped to produce the article desired. What is covered by the patent consists in applying a combining or alloying material in a finely divided state to the surface of highly heated metal and then incorporating such material with the metal by the successive formation of differently shaped projections or depressions whereby the material and the surface metal are kneaded together and restoring the surface of the metal to a uniform plane by pressure applied in a direction normal to such surface. The materials used are carbon, vanadium, nickel, zinc, etc.

937,284 and 937,285. October 19, 1909. ALLOY. Edward B. Craft and John W. Harris, Hackensack, N. J., assignors to Western Electric Company, Chicago, Ill. This invention relates to alloys for use in connection with electrical apparatus, and more particularly to an alloy which may be employed as a substitute for platinum in electrical contacts.

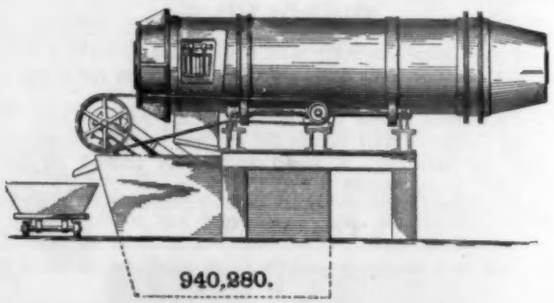
The object of the invention is to provide an alloy which is cheaper than platinum, and which nevertheless possesses the properties which render that metal valuable for use in connection with electrical appliances.

The invention consists of an alloy of gold, silver and some metal, such as platinum, capable of imparting hardness to the alloy.

The silver is introduced in quantities sufficient to materially lessen the cost, without destroying the non-tarnishing property of pure gold, which latter metal constitutes the larger portion of the alloy. This mixture of gold and silver is so alloyed with sufficient quantities of the hardening metal, preferably platinum, to produce the degree of hardness required in material for electrical contacts. The alloy is composed of the above named constituents in about the following proportions: gold, 67½ to 70 per cent.; silver, 25 per cent.; platinum, 5 to 7½ per cent.

940,280. November 16, 1909. ANNEALING AND HARDENING FURNACE. Walter S. Rockwell, New York. Assignor to W. S. Rockwell Company, New York, N. Y.

An improved annealing and hardening furnace, shown in cut. The object of the invention being to insure a uniformly heated and clean product. To secure such results, there is employed an internally fired cylindrical furnace, with a spiral lining, the furnace being rotated at a certain speed and charged and discharged automatically, a pyrometer indicating the actual tempera-



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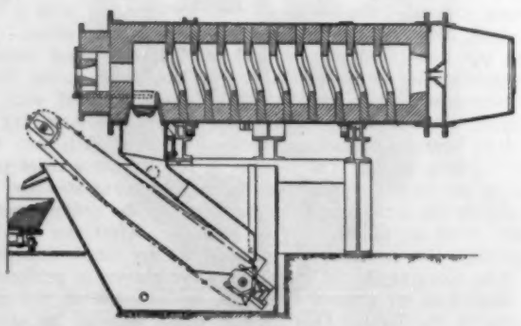
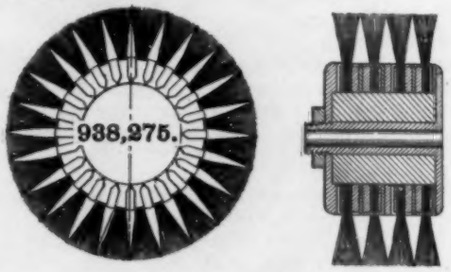


ture at the point of discharge. The only manual part of the operation is that of firing, but as the fuel is constant, and the temperature is indicated by the pyrometer, it is only necessary to get the speed of the furnace and the temperature correct before starting, after which the entire operation is automatic.

The principal claim covering this furnace is as follows: In an annealing furnace, the combination with a cylinder, of means for automatically feeding the material into the cylinder at one end, automatically operated means near its opposite end for discharging a part of said material at each revolution, and a burner discharging into the cylinder adjacent to the discharge end of the latter.

938,275. October 26, 1909. BRUSH. Frederick W. Riehl, Cleveland, Ohio.

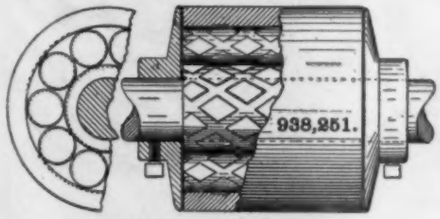
This invention relates to brushes, and has for an object to provide a brush in which the hairs or bristles are separated, as shown in cut, into small bunches and applied to a novel form of hub or head without the use of glue or similar fastening means and to allow quick detachment of the bristles when it is desired to insert new ones.



While it is especially desired to obviate the use of glue or the like in the construction of the brush, it may be stated that it may be employed should the brush be put to considerable strain. It may be found best to apply a small quantity of glue at the inner end of the bristle bunches, in order that they may adhere to the washers and be more securely held therebetween.

938,251. October 26, 1909. ANTIFRICTION-BEARING. Chester A. Latham, Wichita, Kansas.

An improvement in a roller bearing and provides an antifriction bearing in which the contiguous surfaces of the several members or elements comprising the bearing have a reduced contact portion, thus reducing the friction.



It will be noted in referring to the cut, that the axle, the boxing and each roller are provided with reversely arranged intersecting spiral grooves, thus providing alining contact surfaces, with the result that friction is reduced to a minimum and the lubricant is efficiently distributed throughout the surfaces of the various elements of the bearing. The movable elements may then rotate freely about the axle. The contact surfaces are also relatively small to further reduce friction, and the contact surfaces of the various elements overlap in the operation of the bearing. These contact surfaces by virtue of the spiral arrangement of the grooves are necessarily of a diamond or rectangular shape.

938,422 October 28, 1909. METALLIC ALLOY. Gaza Hartmann, New York. Assignor to Hartmann Aluminum Solder Company, New York, N. Y.

This invention relates to metallic alloys, particularly such used as solder, its object being to provide a solder for joining together parts of aluminum, and also for joining aluminum to other metals.

The main object of the invention, however, is the producing of a metallic alloy to serve as solder for joining together pieces of metallic aluminum, both for the purpose of repairing broken structures, or joining together parts of such aluminum structures.

The metallic alloy which has been devised for these stated purposes is composed of tin, aluminum, nickel and of metallic magnesium, and the best result is obtained when these ingredients are compounded in the following proportions, determined by weight, and bearing in mind that the metals to be used shall be of the quality known in the arts as pure: of tin, eight hundred (800) mills, of aluminum, one hundred and seventy (170) mills, of nickel, seven (7) mills and of metallic magnesium, twenty-three (23) mills.

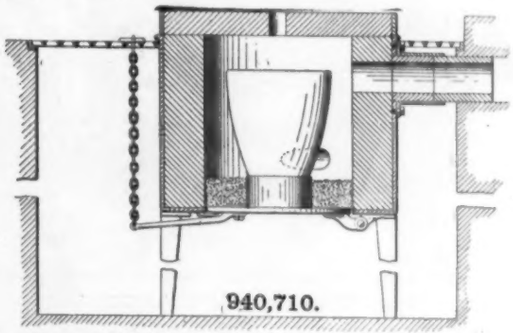
940,471. November 16, 1909. PROCESS OF RECOVERING TIN FROM WASTE. Albert Nodon, Bordeaux, France.

An improved process for the recovery of tin from all kinds of tin lead waste, and more particularly from waste tinned plate, waste lead tin alloy and plated goods resulting from the manufacture of metal, "tin capsules," "tin foil" and tin tubes.

The process consists of dissolving the tin alloyed with or adhering to the lead by subjecting the metal waste to the action of a hot solution of stannic sulphate with the addition of sulphuric acid, mixed with an alkaline stannic haloid salt, which solution has no chemical action on lead, and then separating the tin from the solution by electrolytic means on tin electrodes in suitable galvanoplastic tanks.

940,710. November 23, 1909. METAL MELTING HYDROCARBON BURNING FURNACE. Garnet W. McKee of Chicago, Ill.

A crucible furnace, shown in cut, designed for melting brass or other metals and the invention consists in the novel construction and arrangement of the furnace whereby in case the crucible breaks or the metal is spilled in any manner, the same may be readily recovered.



The flame from the burner passes with a circular motion around the crucible and in case the crucible breaks or metal is in any way spilled, the same can be readily recovered by dropping the trap door which lets the sand run out leaving the metal in a chunk, and the furnace can be immediately put into operative condition again without loss of time.

938,377. October 26, 1909. PROCESS OF UNITING METALS. William Griffith, Pittsburg, Pa.

938,684. November 2, 1909. MOLDING MACHINE. Charles Mills, Newton Upper Falls, Mass. Assignor to W. C. Swift, Chicago, Ill.

940,774. November 23, 1909. APPARATUS FOR TREATING MOLTEN METALS. Francis S. Adams, Leetonia, Ohio.

938,605. November 2, 1909. COFFEE MACHINE. Charles Nelson, Brooklyn, N. Y. Assignor to S. Sternau and Company, New York, N. Y.

938,290. October 28, 1909. PROPELLER. Milton D. Thompson, South Portland, Maine.

939,244. November 9, 1909. APPARATUS FOR MAKING SPIRAL TUBING. Edwin T. Greenfield, Kiamesha, New York.

940,081. November 16, 1909. TEA OR COFFEE POT. Charles F. Smith and George E. Curtiss, New Britain, Conn. Assignors to Landers, Frary and Clark, New Britain, Conn.

941,147. November 23, 1909. SOLDERING MACHINE. William M. Holloway, Chicago, Illinois.

938,122. October 26, 1909. METAL-CUTTING SHEARS. Joseph O. Carpenter, Concord, New Hampshire.

938,312. October 26, 1909. BATTERY. W. M. Gardner, Chicago, Ill. Assignor to Ajax Battery Company, Chicago, Ill.

939,849. November 9, 1909. MOLDING FLASK. James D. Millar, Milwaukee, Wis.

INDUSTRIAL

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

BALANCED ELLIPTICAL CHUCK.

A chuck called the "Oval" being an attachment for metal spinning and turning lathes, for producing elliptical shapes, has been manufactured for a number of years by P. Pryibil, 512 West Forty-first street, New York City. This manufacturer is now putting on the market a new improved chuck, which he calls a "self balancing elliptical chuck." It was designed with the

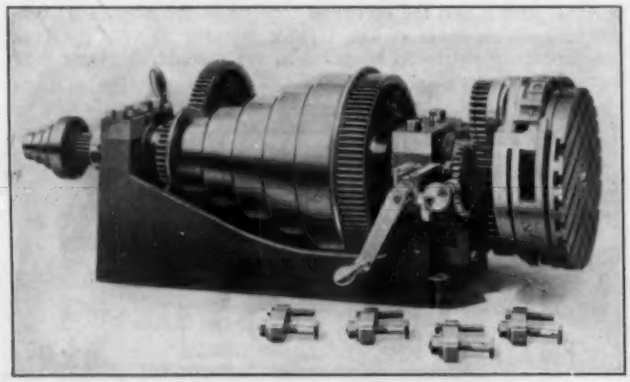


FIG. 1. ELLIPTICAL CHUCK FOR ENGINE LATHE.

object of increasing the rate of speed so far used on elliptic work, and also to eliminate vibrations of the chuck originally made.

He now manufactures two types of these "self balancing elliptical chucks," both shown in accompanying cuts attached to a lathe headstock. The heavier type, Fig. No. 1, is made for engine lathe work for turning steel, brass, etc. The other type, Fig. No. 2, is made for a speed lathe and is used for metal spinning, such as gold, silver, aluminum, copper, brass, zinc, etc. Also for hand metal turning and for wood turning, such as picture and mirror frames and other similar articles. Fig. No. 3, shows the chuck attached to a metal spinning lathe. This

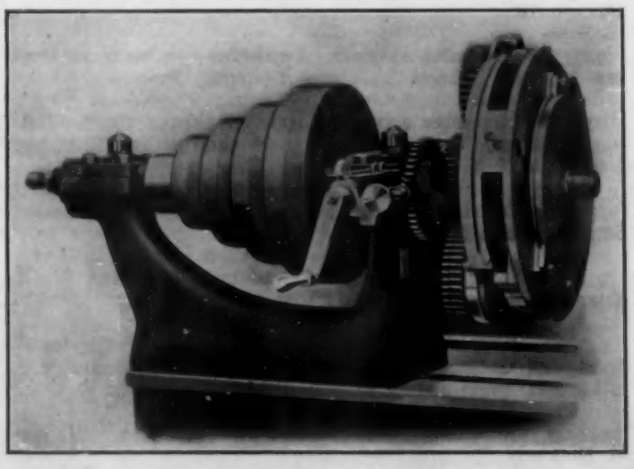


FIG. 2. ELLIPTICAL CHUCK FOR SPEED LATHE.

chuck has been patented in the United States and patents are pending in all the principal foreign countries.

The operation of this chuck is as follows: When the lathe spindle rotates, the cross arm which is attached to spindle, together with the entire mechanism also rotates. The driving gears which mesh with the stationary gear rotate with the cross arm about the center of the lathe spindle, and, owing to the reaction of their teeth on the teeth of the stationary gear also rotate on their own axis and thereby rotate the cranks. When the crank pins are set at zero this rotation of the crank does not affect the motion of the front and rear slides, but when set at any other point the slides are driven back and forth by an amount equal to twice the distance of crank pin from center of crank in its zero position.

A tool set at any point on a horizontal line passing through the center of lathe spindle, will, when the crank pin is set at zero, describe a circle on the front face of front slide; but when the crank pin is at any other point of its throw it will describe a perfect ellipse, having a difference in its minor and major axis equal to twice the distance of crank pin from its zero position. This difference is indicated directly on scale attached to a bracket.

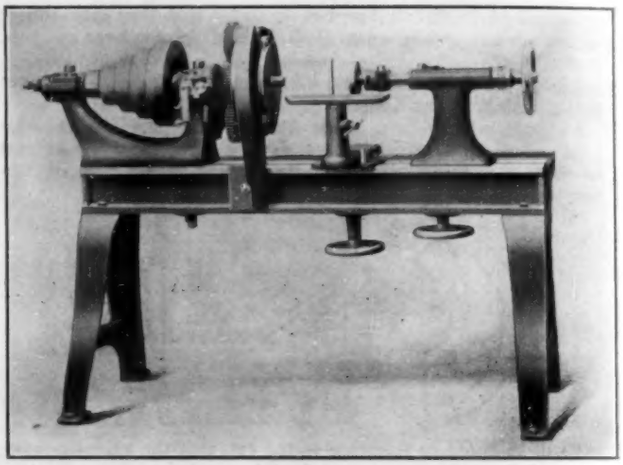


FIG. 3. ELLIPTICAL CHUCK ON A METAL SPINNING LATHE.

The adjustment of the throw of crank pin can be effected either while the chuck is rotating or at rest by simply turning the hand crank, which by means of the miter gears and the spur gear causes spur gear to rotate and operate adjusting gears (No. 014) which in turn operate the bevel gears in crank (No. 010) turning the screw which operates the crank pin and alters its throw. The rotation of the chuck does not affect the adjustment of crank pin as the gears (No. 014) simply roll on gear (No. 015) without causing it to rotate. The balancing of the chuck is attained by setting the cranks so that the front and rear slides are both driving towards the center or outwards from the center at the same instant.

Full description of the construction of this chuck can be obtained by writing to the manufacturer.

EMPIRE STATE MOLDING SAND.

The Manufacturers' Supply House, of 1012 State street, Erie, Pa., have opened up a tract of land in the western part of New York State which produces a fine grade of molding sand. This sand is known as "Empire," and is claimed to be a little better than any other on the market for brass, aluminum and fine gray iron castings. The fact that the company recently received an order for a carload to be shipped to Vancouver, British Columbia, backs up this claim. "Empire" sand is graded from No. 00 to 1, and samples and prices will be sent upon request. Any one desirous of obtaining some of this sand in a city with no established freight rate is invited to write the company. They will have the matter attended to and will be ready to ship in the early spring.

DRESSES 20-INCH FULL UNIVERSAL MONITOR LATHE.

A lathe designed for general brass and similar work of heavy character has just been brought out by the Dresses Machine Tool Company of Cincinnati, Ohio. This lathe is called the Full Universal Monitor Lathe shown in cut, and the object of it is to manufacture without special tools in a more economical way than is possible with an ordinary Universal Monitor Lathe.

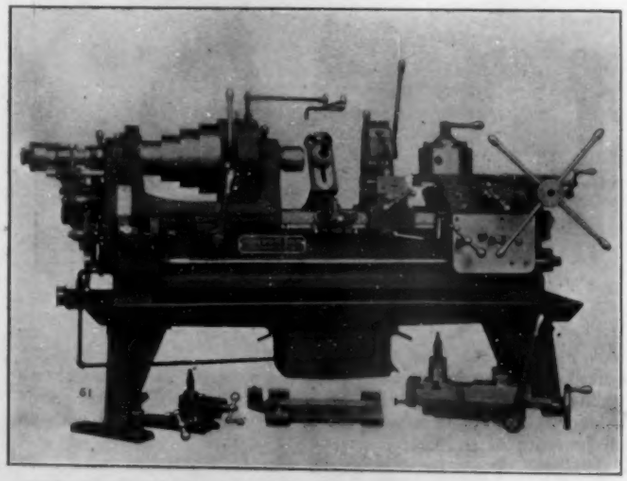
The turret carriage is provided with an automatic all-geared feed similar to that of an engine lathe with quick change gear box. The coarsest feeds are 8, 11½, 14 and 18 per inch, conforming with the standard pipe threads. By means of a slip gear, these four feeds are multiplied by 4 and so can be used as turning and boring feeds, making 8 instantaneous changes. Other feeds and pitches can be easily obtained by change gears.

Interposed between the upper and lower part of the turret carriage is a double dovetailed plate, to the lower side of which is a shoe swivel connected which slides on the bar of the taper attachment shown below the oil reservoir of the bed. The frame of this attachment slides on the inside of the bed and a clamping bolt holds it in position. The whole arrangement can be readily removed when not in use and no special provisions are necessary in the construction of the bed. By this arrangement, in and outside, taper and straight threads can be chased by the turret without the use of a tap or die.

The upper part of the intermediate dovetailed plate has a screw with ball crank for cross feeding by hand and positive clamping stops are provided for setting the holes in the turret in alignment with the spindle. The turret carrying slide is provided with a pilot wheel for rapid movement and also with a screw for finer adjustment.. The pilot wheel with stem is removable so as to be out of the way when the screw feed is used. The turret revolves on a stem with adjustment for wear and the locking bolt withdraws at the return movement of the top slide, making it semi-automatic.

The head stock has all-enclosed friction back gears, the friction is of the toggle joint type and so designed that the whole operating mechanism can be put in place or removed without taking out the spindle. The spindle is provided with an automatic chuck, of the well known pattern, operated by the handle shown below the cone pulley.

The chasing bar has a yielding follower holder maintaining contact with the leader when chasing taper work. The taper



DRESSES 20-INCH FULL UNIVERSAL MONITOR LATHE.

attachment is provided with knurled screws for minute adjustment. The machine is also equipped with a vertical forming rest, cutting off rest, hand and slide rest so that it can be used for all possible work occurring in the line of manufacturing brass or similar goods. It is also provided with a pan, oil reservoir, pump and piping which adapts it for iron and steel work. It swings 20½" over the V's, has a 6' 6" bed and weighs about 3,600 pounds.

THE HOYT MULTICIRCUIT VOLTMETER.

The line of voltammeters, voltmeters and ammeters manufactured by The Hoyt Electrical Instrument Works, Penacook, New Hampshire, as exemplified by the multicircuit voltmeter here shown are all constructed on the D'Arsonal principle. The principle depends upon the fact that a permanent magnet furnishes a strong magnetic field within the poles of which a coil, centrally pivoted and acting against a spring control, is rotated by an electric current passed through its windings.

The Hoyt Company have improved these instruments in a number of ways and claim that the design of their pole pieces,

HOYT MULTICIRCUIT VOLTMETER.

however, is entirely novel in that they are formed in heavy, specially constructed dies. By this form of construction they secure at a low cost a mechanical uniformity that could only be obtained in the older designs.

They have further improved the construction by supporting the magnet and pole pieces on a one-piece, die-formed angle plate which also secures the complete system to the containing case. This assures a rigidity that cannot be equalled by any other means.

Their method of supporting the moving system is unique and deserves more than passing mention. They securely rivet the pivots to the inner surface of the aluminum frame on which the wire is wound, and recess specially designed screws, carrying the jewels, into the iron core around which the coil rotates. Thus the coil rests on the top jewel, and is centrally guided by the bottom jewel. A metal finger carrying one end of the controlling spring is securely attached to the outside surface of the aluminum frame, and upon this is wound the wire which carries the current. The other end of the controlling spring is attached to an arm insulated from the plate which supports the pole pieces.

By means of this construction zero errors can be readily corrected without any danger whatever of changing the adjustment of the bearings. The multicircuit voltmeter is made in two sizes: the six inch with a capacity of 6 tanks and the 8 inch for 14 lamps. The Hoyt company also makes these electrical indicating instruments in pocket, portable and switchboard styles.

Prices and catalogues sent upon request.

WHITELEY'S COLORING BOARD.

This coloring board is used by platers and manufacturers of jewelry and novelties and is preferred to the dynamo by many for coloring and plating because of its simplicity and ease of operation. The board is fastened on the wall out of the way and when not in use the snap-switch shuts off the current so that the cost of operation is very slight when compared with the ordinary means of doing this work. The board is connected to the lighting system, direct current only, and it is furnished with bulbs of graduated size so that the current may be nicely adjusted to any possible requirements. There is no waste of current when it is not needed neither is there a lack of current when it is required. The board is neatly constructed and is approved by fire underwriters.

In ordering these boards, care should be taken to see that the current is direct and exact voltage should be given. These boards are for sale by Leiman Brothers, 62 John street, New York, and 70 Bonykamper avenue, Newark, N. J.

ENAMELING BY SPRAYING.

On several occasions the subject of applying lacquer, enamel, japan, bronze, etc. on manufactured articles by compressed air with the air brush as introduced by the Eureka Pneumatic Spray Co., 276 Spring street, New York, has been described in these columns. Thousands of manufacturers have taken advantage of the great benefit of improved finish and saving in labor derived from this process, which gives universal satisfaction. Recent experiments reported by this concern have developed a substitute finish for nickel and silver plate which does away with the objections of plated metal plumbing. Plumbing fixtures where ever used and whether plated or not required constant polishing. If plated in a short time the plating is worn through. The work tarnishes. Soap, acids, etc. coming in contact with the metal produces verdi-gris. There has therefore been a demand for a substitute which will be more sanitary, look cleaner and require less care.

Nothing looks as well on bath-room fixtures, bar plumbing, etc., as a pure white enamel. Enamel paint would not answer as it turns yellow, cracks, chips and is not acid proof. The celluloid enamel is claimed to be the only thing which will meet the requirements of fixtures which in all cases are subjected to severe conditions. Celluloid enamel could not be successfully applied in the past, but by the use of the machinery and process supplied by the Eureka Pneumatic Spray Co., they declare a child can finish all grades of metal plumbing goods a great deal cheaper than the commonest nickel plate, the finish being absolutely water proof and acid proof and is most desirable for bath-room seats, tanks, etc. Work properly finished with this material and process is practically indestructible, even though the article is struck and dented the finish will not chip off.

The above named concern offers to finish samples for anyone with this material and process if sent prepaid by express to their address. A complete outfit for applying this finish may be had at a remarkably low cost, usually saving its cost in the first few weeks of its service. Full description of machinery and process will be sent on application. This concern owing to greatly increased business has recently moved into the Spring street building and are prepared to demonstrate the finish at all times, guaranteeing everything and in every case making good their guarantee. It is seldom that a machine or device is gotten out which makes a labor saving of more than 5 or 10%. It is rarely that the labor saving by the Eureka Pneumatic Spray Co. is less than 50%, frequently it is much higher. Nine years of success guarantees that the customer will get the right article and will have the benefit of their experience in every line of manufacture.

RUSTPROOF NICKELING OF STEEL AND IRON.

By John Nelson.*

Much harm has been done to the plating industry by the production of plated articles that would not stand exposure without rusting. We often find that when some one is buying a pair of skates for instance they will not pay the extra cost for nickel plating because they believe that it will not protect against rust which unfortunately is mostly the case. However there is rapidly coming to the front an army of progressive manufacturers of plated articles who make goods that have enduring qualities, so that their name on the article will prove a most valuable advertisement in place of a warning against inferior qualities that is too often the case. Such manufacturers soon build up a business that pays them handsome profits to which they are indeed entitled as they are giving honest value to the consumer, and increase the public's demand for plated articles.

I do not desire you to come to the conclusion from what I have said here that it always costs less to produce inferior nickeling, as quite often it is the reverse, as for instance by the previous plating of zinc on a number of articles, two or more polishing operations are saved which pays for the extra cost in plating and buffing and leaves a profit besides.

It seems strange that in view of the great merits of zinc plating and the long time that this art has been known that only of recent years has it come into use extensively, but it is even more strange that since the durability of a zinc coating is increased a hundred fold as well as made more attractive by a subsequent coating of nickel, and since nickel plating can be made rust proof by a previous zinc plating, that this is not taken advantage of more extensively. Formulas for zinc plating and nickeling on zinc, will be furnished free, upon request, by the writer.

*2220 Wilson avenue, Chicago, Ill.

PORTABLE PNEUMATIC MOLDING MACHINE.

The J. F. Webb Manufacturing Company, Davenport, Iowa, has developed a new portable pneumatic power ramming molding machine, to be used for snap flask work and such work where one man can handle the flask. The cut shows the machine with ramming head swung back ready for the flask. For patterns that are mounted on plates the flask is placed on table of machine with the pattern between the cope and drag of flask. The drag is filled with sand, the bottom board placed in position and the flask rolled over, then the cope is filled with sand. The head with the cylinder attached is swung forward and the air turned on, when the piston travels downward and rams the sand, ramming both cope and drag at one operation.

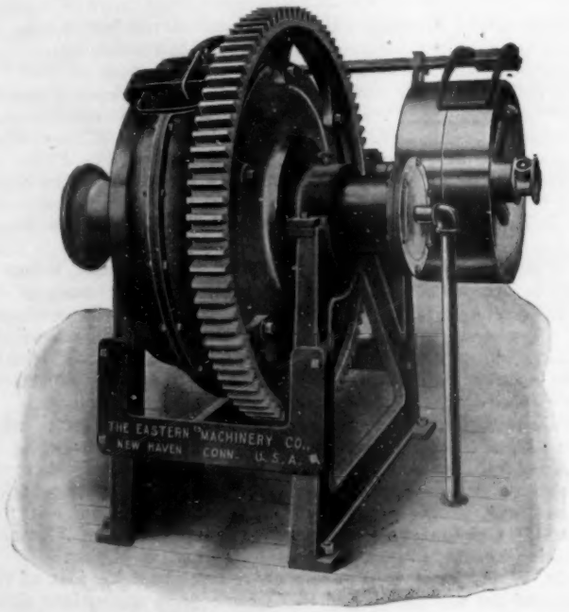
PORTABLE PNEUMATIC MOLDING MACHINE.

The cylinder can be adjusted with the adjusting nuts on the side rods, so that the sand can be pressed to any density required. The swinging head with the cylinder is adjusted with springs so that it swings with very little effort and is evenly balanced. Flasks 14 x 20 x 8 ins. deep can be rammed with an air pressure of 40 lbs.

This cut shows the "Mumford vibrator" attached with knee valve to operate same. The pop valve above the cylinder regulates the pressure so that it is impossible to ram the sand too hard, thus making all molds rammed uniform. Air is let into the cylinder with a three-way valve at the right side of the machine. This valve has a stop, so that it requires no special attention to turn on the required amount of air. This machine is constructed along such lines so that there is no repairs, and will stand hard and continuous service under the most exacting conditions. It cannot be thrown out of adjustment easily, and has been designed to obtain the lightest possible construction with the requisite strength. The machine is built in two sizes, 10 x 30 ins. and 12 x 36 ins., either portable or stationary.

SALES OF NEW CRUSHER.

Since placing on the market the new form of Hill Cinder Crusher shown in cut, the Eastern Machinery Company, of New Haven, Conn., the present manufacturers, report that they have sold these crushers to the Hays Manufacturing Company, Erie, Pa.; The S. Obermayer Company, Cincinnati, Ohio; the Millett Brass Company, Springfield, Mass.; the Fairbanks Company, Montreal, Canada, and a number of others.



NEW STYLE HILL CRUSHER.

The crusher shown in cut is an improvement on the old type of Hill crushers and is of smaller size. The regular type of Hill crusher was illustrated in the issue of THE METAL INDUSTRY of March, 1906, in connection with a special article on "The Recovery of Brass from Foundry Refuse." The article gave in detail the methods of obtaining metal from ashes and described all of the then existing types of crushers.

In the crusher shown herewith the driving gear has been placed on the side instead of on the periphery of the machine. It is equipped with tight and loose pulleys and there is an improvement in the water inlet and dumping arrangement. Further particulars may be had from the manufacturers, The Eastern Machinery Company, of New Haven, Conn.

THE UTILIZATION OF MAGNESIUM IN THE BRASS FOUNDRY.

The results of some recent experiments in brass foundry work, using pure magnesium in stick form as a deoxidizing agent are reported by C. W. Leavitt & Co., dealers in ores, metals and alloys, of 30 Church street, New York. The results of these tests are as follows:

Composition.	Tensile strength. lbs. per sq. in.	Elongation.	Remarks.
60% old copper, 14% nickel	30.200	2.5 %	No magnesium
26% zinc	35.200	8.5 %	0.10% "
52% old copper..	27.800	3.5 %	No magnesium
22% nickel	29.100	10.75%	0.10% "
26% zinc, 55% old copper ..	30.000	7.00%	No magnesium
26% nickel, 19% zinc	31.700	11.00%	0.10% "
55% old copper...	24.900	7.25%	No magnesium
25% nickel, 18% zinc	33.700	12.25%	0.10% "
2% iron.			

It has been found that the higher the nickel contents the more refractory are the copper-nickel-zinc mixtures, and for that reason the cross cuts of the channels as well as the gates of the mold must be correspondingly larger. It is further necessary to slightly cool off the melting baths by adding remnants of the same kind of alloy before adding the zinc in order to avoid the excessive oxidation of the latter. To prevent heat cracks the clamp screws should be loosened after the process of casting, and care should be taken not to disturb the mold while doing this. The addition of magnesium for the above line of work should take place after the melting is completed, when the crucible with contents is taken from furnace and thoroughly skimmed.

The introduction of magnesium to the mixture may be advantageously carried out by means of the stick of magnesium enveloped in a coating of copper, and special care should be exercised when alloying magnesium with the metal in preparation, that the magnesium be immediately plunged to the bottom of the crucible and kept there until molten, as it will otherwise float on the surface and burn away, or as in the case of molten brass, it will become coated with oxide of zinc and remain unmelted. Some works add the magnesium in the form of a magnesium-copper alloy, and others have obtained excellent results by the use of a phosphorizer. The specific gravity of magnesium is 1.74 and the melting point 648.9 degs. Cent. and 1200 degs. Fahr.

LANGBEIN ON LACQUERS.

BY CLINTON DE BAUN.*

The sixth edition of Dr. George Langbein's Electro Deposition of Metals,† edited by Wm. T. Brannt, include a brief history of lacquering—pages 521 to 532.

After a short history and description of lacquers and lacquering, the work proceeds and says: "A review of all the lacquers made for the above mentioned purposes is not within the province of this work, and we must therefore confine ourselves to the enumeration of the newest and most important ones for general use, with which we have become familiar."

Then follows a description of a few of the newest lacquers including a special invisible lacquer for grille work; a satin finish lacquer; a dip lacquer for pickled castings to be copper-plated and oxidized; helios dip lacquer, special; a series of dead black lacquers and lacquers for high luster finishes, as well as on goods made from non-ferrous metals; also a dead black lacquer as a substitute for bower-barff, as well as antique black, ebony and rubber finish lacquers. After this a very thorough description of spraying lacquers and their uses, both colorless and black, giving full details as to their application and the reasons for their use. Water dip lacquers are then thoroughly covered.

The lacquers which have been tested and with which the author is familiar, and describes, are all made by The Egyptian Lacquer Manufacturing Company, of New York City. To anyone interested in the use and application of lacquers the article is one of intense interest, although it covers but a few pages.

PROGRESS OF SHERARDIZING.

The United States Sherardizing Company, of New Castle, Pa., report that they are having splendid progress in introducing their process of dry galvanizing in America. They have just installed a plant for the General Electric Company, of Toronto, Canada; one for the Westinghouse Electric and Manufacturing Company, Pittsburg, Pa., and one for the Mark Manufacturing Company, of Chicago, Ill. The company reports that the National Metal Molding Company of Pittsburg turned out 500 tons of sherardized conduit pipe in the month of November and that they are arranging to double the capacity of their plant as they have not been able to supply the demand for this article.

The process of sherardizing or dry galvanizing has been described in THE METAL INDUSTRY several times, first notice of the process being in August, 1904, and the technical progress since that date has been fully illustrated and described in subsequent issues.

*Of Egyptian Lacquer Manufacturing Company, New York.

†This book is for sale by THE METAL INDUSTRY. Price $4.00.

Associations and Societies

REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

NATIONAL ELECTROPLATERS' ASSOCIATION OF THE UNITED STATES AND CANADA.

President, Chas. H. Proctor, Arlington, N. J.; Treasurer, Nathan E. Emery, New York, N. Y.; Secretary pro tem., Percy S. Brown. All correspondence should be addressed to the Secretary, P. S. Brown, 906 Summit avenue, New York. The objects of the association are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. Meets the first Saturday of each month, 8 p. m., at the Hotel Chelsea, 222 West Twenty-third street, New York City.

The tenth regular meeting of the National Electroplaters Association was called to order by the President at the Hotel Chelsea, New York City, at 8 P. M., Dec. 4, 1909, with 30 members present.

The Secretary read communications from various applicants, many of whom showed great interest in the assosiation.

Oscar Hillman and John Lockerbie were elected active members, and G. H. Niemeyer and Dr. A. Tessler were elected associate members. Mr Daly, President of the International Association of Platers', Polishers' and Buffers' Unions, requested the privilege of the floor, but upon vote this was denied on the ground that the association is positively opposed to Unionism.

Librarian Hogaboom reported that the average salary of the foreman plater as taken by count at a previous meeting was $27.50 per week. He also reported that he had received from the Dow Chemical Company, Mansfield, Ohio, a nearly complete file of back numbers of The Plate and also bound volumes of THE METAL INDUSTRY for the years 1906-1907 and 1908. The thanks of the association was tendered to the donors.

After considerable discussion it was voted to rescind the motion passed at the last meeting regarding the publication of papers read before the association. The record of the previous action was ordered stricken from the minutes. It is now possible for members reading papers to have them published if they so desire, without submitting them to a vote of the society. It was voted that the next regular meeting be held Jan. 8, 1910. It was decided to place an advertisement in THE METAL INDUSTRY stating that the association will receive applications from any firm desiring the services of first class platers and foremen. Also suggested that the secretary notify the supply houses who have representatives in the association that it will be appreciated if they will instruct their traveling men to advise the association of positions they may know to be open.

It was suggested that members who are out of work send name, address and class of work desired to the secretary and any member knowing of a position should notify the secretary as soon as possible. It was decided to have a committee appointed by the chair to answer inquiries made by members on plating subjects, the secretary to forward the inquiries to the chairman of the committee who shall then send copies to the members of the committee. The members of the committee will send their replies to the chairman who will then reply directly to the person making the inquiry. The secretary will answer the letter of inquiry as soon as possible after receiving it, stating that it has been turned over to the committee for their action. This committee will be announced at the next meeting.

The committee on incorporation presented the certificate of incorporation and other papers which were passed around for inspection.

The banquet committee reported that they had made arrangements for a banquet to be held Jan. 15, at the Hotel Marlborough, Broadway and 36th street. The dinner will be called "The Get Together Dollar Dinner," and any one who is interested in electroplating and finishing will be welcome. A number of speakers have been secured, including Mr. Richard Moldenke, secretary of American Foundrymen's Association, who will speak on "Get Together." Mr. W. A. Jones, chemist of Celluloid Zapon Company on "Laquers." S. D. Benoliel, manager International Chemical Company, Camden, N. J. on "Chemical Compounds," and P. S. Brown, chemist Western Electric Company on "The Future of Electroplating from an Electro-chemist's View." Members desiring to attend this banquet are requested to correspond with the chairman of the committee, George B. Hogaboom, 656 Hunterdon street, Newark, N. J. The price of each ticket is $1.00 and each ticket must be countersigned by a member before it will be accepted. All returns for tickets must be made at the next meeting, Jan. 8. An earnest invitation is extended to all persons interested in the welfare and progress of the plating industry to attend the dinner and bring their friends. The speaking will be of the highest order and the objects of the association will be explained.

It was suggested that the members advise the secretary what line of work they specialize in for purposes of registration.

A general discussion took place on the streaking of acid copper deposits. The general opinion appeared to be that the addition of ordinary alum to the solution would tend to prevent this trouble. Opinions were expressed regarding the value of organic addition agents to various electrolytes used in plating.

Dr. W. A. Jones then gave a short talk about his idea of the value of the association and made some good suggestions about the reading of papers and similar topics of interest. Messrs DeBaunn, Buchanan and Davis also spoke a few words to the members.

AMERICAN BRASS FOUNDERS' ASSOCIATION.

President, Wm. R. Webster, Bridgeport, Conn.; Secretary and Treasurer, W. M. Corse. All correspondence should be addressed to the Secretary, W. M. Corse, 1155 Sycamore street, Buffalo, N. Y. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the American Foundrymen's Association in a succession of cities, as invited. The next convention will be held in Detroit, Mich., June, 1910.

Secretary Corse reports the following just elected to membership in the association: Buffalo Scale Co., Mr. T. L. Richmond, Pres., 81 Scott street, Buffalo, N. Y., and Mr. R. F. Lang, 31 Broadway, New York City.

NATIONAL ASSOCIATION OF BRASS MANUFACTURERS.

President, Joseph H. Glauber, Cleveland, Ohio; Commissioner, William M. Webster, Chicago, Ill. All correspondence should be addressed to the Commissioner, William M. Webster, 1110 Schiller Theatre Building, Chicago, Ill. The objects of the Association are to promote in all lawful ways the interests of firms engaged in the manufacture of brass goods. Meets every three months. Each meeting fixes the place and date of the meeting to follow, consequently there is no stated place. It has been customary for the Association to hold its Annual Meeting in New York City, but the last meeting was held in Philadelphia. The Semi-Annual Meeting is generally held at Atlantic City or some other seacoast town.

The National Association of Brass Manufacturers held their annual meeting at the Hotel Astor in New York, Dec. 7 and 8, 1909. The officers for the coming year were elected. The final list report of the List Committee, which has had charge of the publication of the new official catalogue, was received and acted upon.

ITEMS OF INTEREST TO THE INDIVIDUAL.

Robert F. Voris has become foreman of the buff-room for the Springfield Metallic Casket Company, Springfield, Ohio, manufacturers of casket hardware.

H. H. Meyers of Bridgeport, Conn., has accepted the position of foreman plater with the Vulcanite Manufacturing Company, Lindenhurst, L. I., manufacturers of brass novelty goods.

C. P. Mebane, manager of the Homogen Department of the Allyne Brass Foundry Company, Cleveland, Ohio, recently visited New York in connection with extending the sales of Homogen.

Plym C. Davis, for ten years with the Cuyahoga Telephone Co. has severed his connection with the company and taken a position with the Cleveland Gas Fixture & Brass Company, Cleveland, Ohio.

President W. S. Allyne and Vice-president King of the Allyne Brass and Foundry Company have been in Cleveland, Ohio, during the past month looking after the branch plant of this firm in that city.

Irving A. Murphy, former assistant manager of the Gerson-Carey Company, Lansing, Mich., has resigned his position with that firm and accepted a position as manager of the Jackson Brass Foundry Company, Jackson, Mich.

Chas. J. Caley, former general manager of the Russell and Erwin Manufacturing Company, of New Britain, Conn. has accepted a position as Works Manager with the Peterboro Lock Company, of Peterboro, Ontario, Canada.

Mr. Charles Atkinson, general salesman of the Allyne Brass and Foundry Company, has arrived in Detroit, Mich., after a long trip through the West. He will be in the city for some time before he leaves again for the West.

E. L. Frisbie, one of the officers of the American Brass Company, Waterbury, Conn., testified as an expert on copper values in the recent trial in Waterbury of S. A. Alderman, a New Haven junk dealer, for receiving stolen goods.

Wm. T. Nicholson, for the past seven years traveling salesman for Cutter, Wood & Stevens now changed to the Cutter & Wood Supply Company, manufacturers of foundry and plating supplies, of Boston, Mass., is no longer in their employ.

W. G. Rowell is now associated with R. B. Seidel, Inc., crucible manufacturers of Philadelphia, Pa., as salesman in the Eastern territory. Mr. Rowell was formerly connected with the firm of W. G. Rowell & Company, brass founders at Bridgeport, Conn.

Among the honorary pall bearers at the funeral of the late Hon. Orsamus R. Tyler, a State railroad-commissioner, of Torrington, Conn., were the Hon. Charles F. Brooker of the American Brass Company, of Ansonia, Conn. and the Hon. Thomas D. Bradstreet of the Seth Thomas Clock Company, of Thomaston, Conn.

V. F. Hatch who was formerly connected with the Riverside Metal Company, Riverside, Burlington Co. N. J., has accepted a position as salesman with the Seymour Manufacturing Company, of Seymour, Conn., manufacturers of German silver, brass, copper and bronze in sheet rod, wire, rod and tube, also copper and nickel anodes.

A. A. Greenburg, formerly manager of the Syracuse Aluminum and Bronze Company, Syracuse, N. Y., has been appointed Eastern sales manager of the Homogen Department of the Allyne Brass Foundry Company, Cleveland, Ohio. Mr. Greenburg's territory will comprise the New York metropolitan district, Philadelphia and New England.

Ernest A. Lewis, the noted metallurgist, located at 310 Dudley Road, Birmingham, England, has recently extended his laboratory and increased his staff to deal with his increased work. Mr. Lewis now has separate laboratories for assaying or analysis and the microscopic examination of alloys. He makes a specialty of examining material shipped from America.

Herbert J. Hawkins, who is well known to the plating industry as the author of the "Polishing and Plating of Metals," and who has been traveling for the last year for the Dow Chemical Company, Mansfield, Ohio, has severed his connection with that firm and taken a similar position with the Hanson & Van Winkle Company, for whom he will travel from the Chicago office.

A number of changes among foreman platers has recently taken place in Newark, New Jersey. George Gehling, foreman plater for Sargeant and Company, manufacturers of saddlery hardware has taken a similar position with the Universal Caster and Foundry Company. J. Griffin, foreman plater for the Newark works of the Westinghouse Electric and Manufacturing Company, has taken charge of the plating department of the Sargeant Company while A. Dulgé formerly assistant plater at the Westinghouse plant has been promoted to the foremanship.

Charles Kirchhoff, who for almost 30 years has been connected with The Iron Age, announced his retirement from the editorial management in the issue of Dec. 2. For the past five years Mr. Kirchhoff has had associated with him George W. Cope and Alvin I. Findley, of whom he says in his announcement: "Both have been in complete and hearty sympathy with the methods and traditions of the paper. They possess the accurate knowledge of the industries it represents which grows out of lifelong training. They will maintain the independence, strengthen the reputation for accuracy and fairness, and further develop the journalistic enterprise of The Iron Age."

DEATHS

Chauncey Peck, an inventor formerly employed by the Benedict & Burnham Company, Waterbury, Conn., died in Burlington, near Torrington, Conn., Nov. 5. He was about 50 years old.

The death of Benjamin R. Kelsey in New York, Thursday, Dec. 2, is mourned in nearly every factory in Waterbury, Conn. Mr. Kelsey was a prominent figure for years in local political and industrial circles.

John H. Williams died at his home, 113 Pennsylvania avenue, Newark, N. J., Nov. 24. He has been engaged in the making of jewelry since boyhood and was an expert refiner. He was one of the "old men" of the trade having been born in 1833.

Charles Dwight Upson, a veteran metal worker, died in Waterbury, Conn., a few days ago at the age of 88 years. He was a brass finisher and had worked for Benedict & Burnham Company, the old Brown & Elton firm, and the Holmes, Booth and Haydens concern in his day.

Frederick Martin, one of the owners of the Gas Fixture & Brass Company, Cleveland, Ohio, died during the past month from

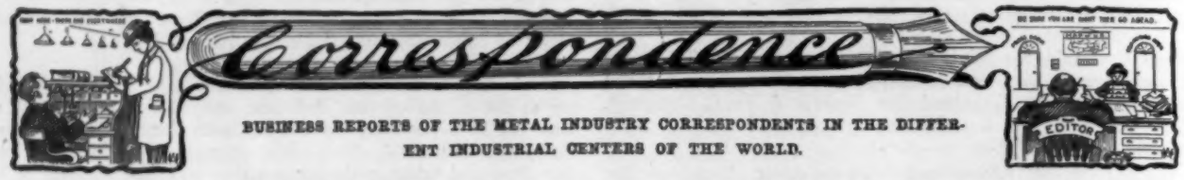
heart disease. One night when about to retire he was stricken. An unusual tribute was paid to his memory by 100 employees of the company who asked that the plant be closed three days until after the funeral had taken place.

Eugene Unger, of Unger Brothers, silversmiths and jewelers, Newark, N. J., was killed on Nov. 15 by a fall from his horse. Mr. Unger was 58 years old and for 30 years had been the head of Unger Brothers. Under Mr. Unger's direction the company had splendid success. The jewelry and silver articles produced by the firm became celebrated for quality, design and finish. Upward of 20 years ago the firm erected their present fine factory at 416 Halsey street. Mr. Unger was a member of the Board of Trade, a director in the Manufacturers' Bank and a prominent member of St. Paul's Methodist Church. He leaves a widow, two sons and two daughters.

Emmons D. Guild, Attleboro, Mass., one of the foremost jewelers, died recently at his home after a lingering illness. He was 66 years of age. Mr. Guild was president of the W. H. Wilmarth & Company Corporation, one of Attleboro's biggest manufacturing jewelry concerns. He had been connected with the company for 30 years.

Mr. Guild was a descendant of one of Massachusett's oldest families. His parents moved to Attleboro when he was quite young. Before the war he was employed in the factories of the town as a jeweler. He enlisted at the outbreak of the war and because of gallant service was promoted to be a sergeant. He was taken prisoner on Oct. 12, 1863, and spent 500 days in various rebel prisons.

After returning to Attleboro he was connected for a long period of years with H. C. Luther and Kingman & Hodges. In 1881 he entered the employ of the Wilmarth Company and soon became foreman. Eighteen years ago he was made a partner and a few years ago was elected president. He was prominent in G. A. R. and fraternal circles.



BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS IN THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

DECEMBER 6, 1909.

So complete is the restoration of prosperity to Waterbury industries and Naugatuck Valley business in general that the manufacturers hereabouts are looking forward to 1910 as a banner year unless unforseen complications arise in labor matters. Optimism is the keynote, however, and it will indeed be a far-reaching trouble that will clog the wheels at their present speed. Goods are being produced for the world's market at a greater speed than in the busy year of 1906 and yet is no danger seemingly of over-production.

Trade and government reports here, from Great Britain, France, Germany and even some of the South American countries show a steady increase in consumption and any decrease in imports in those countries has not affected Waterbury products as yet. Nor is such an effect expected as the variety of manufactures here can hardly be duplicated in any other single metal manufacturing center at home or abroad.

Stockholders of the American Brass Company considered the dividend of five per cent. paid this year satisfactory but the company was able to add an extra dividend of one per cent. which was paid during the past month on account of the prosperity of the last six months. Even a larger profit is looked for next year.

Every shop is booming, the little ones sharing the rush with the large ones. Several hundred hands are receiving from six to twelve hours' overtime pay weekly at the Scovill Manufacturing Company's, the American Brass Company's, the Chase Rolling Mills Company's, the Waterbury Manufacturing Company's and the Waterbury Clock Company's shops and practically all are employing the maximum number of hands. In the suburbs the plants of the American Pin Company, the Oakville Company, also pin makers, the Baird Manufacturing Company, the Blake & Johnson Company, the Berbecker & Rowland Company and smaller shops are running at the same speed and if water supplies were a bit more satisfactory they could be striking a faster gait.

Water has not improved any during the past month. Where it has never before been felt the drought is a serious hindrance now and only the closest economy has kept some departments in the larger factories open. What little rain fell through November was of practically no account at it was soaked up by the parched ground and had almost no effect on the brooks or canals used so much by the factories. The Naugatuck river bed is almost as dry as a bone in places and what water is flowing through is practically worthless.

There was much relief when the State health authorities decided not to interfere with the construction of a new dam in the city's proposed reservoir addition at Thomaston, for although not likely to be available for two years at least, the new reservoir is already being counted on by the manufacturers to set aside their water troubles for a decade or two.

Dry weather has aided in facilitating the extension of plants, however, and the winter will see hundreds of employees in new departments in several sections of the city and its environs. Up in Oakville, the Oakville Company has just roofed in a fine new five-story addition and has been busy grading and improving the grounds. The company has grown so fast that it is always never compelled to turn away respectable applicants for work and there have been rumors of late that it has had agents busy in Canada arranging to bring families of new workmen here. The village is growing so rapidly that it already equals the town of Watertown, of which it is a district, in influence and surpasses it in population. It may not be long before the shop owners will be asked to help establish it as an independent borough on this account.

Additions to plants of the Scovill Company, the Waterbury Manufacturing Company and improvements on the property of the American Brass Company, started last summer, have been nearly completed and in some cases are occupied. The moving of the Blake & Johnson Manufacturing Company from its old East Main street buildings to its new factory in Waterville has been completed and the workmen are happily installed in one of the finest plants in the State and, in many respects, model buildings. Two new factory buildings of the Berbecker & Rowland Manufacturing Company in Waterville are being roofed at this time and will be in use before the winter is ended. The Scovill Company has just let out a contract for another factory addition on Hamilton avenue, the eastern end of its extensive property. It will be four stories high and 140 x 83 on the ground plan. Another important addition to the Scovill buildings is a power house on Hamilton avenue, composed of two brick buildings.

Building plans are by no means ended. To provide for future growth the Oakville Company recently acquired twenty-eight acres of the A. H. Mattoon estate adjoining its property in Oakville and the Chase interests have extensive plans to be developed on their Waterville sites in the next year of two. The Scovill plant will in a short time be the most imposing in the city, covering all of the south side of East Main street, where it has been content to grow in the back yards of that well settled quarter in the past. But a half dozen buildings, now owned by the company and soon to be removed, now share with it the large city squares which it has grown over.

An up-to-date Oakville concern is the Baird Machine Company which has grown rapidly of late. Its smokestaks have caused no complaint but its officers, anxious to merit the good will of the community, are experimenting now with a plan for disposing of much smoke. In a shanty in which coke is burned with water

running through it, most of the smoke is burned before it reaches the open air. It is condensed and but an inoffensive minimum escapes. If a satisfactory process can be worked out the company will try to eliminate the smoke evil in its section.

Great interest is evinced among the manufacturers here in the copper combine stories but there is no unanimity of opinion as to the practicability of the plans proposed, according to despatches, for the merger intended. That the Standard Oil decision recently handed down has delayed the combination is not regretted, although there is really little concern at present over the possibility of corners in copper. It was largely through the efforts of Charles F. Brooker and other officers of the American Brass Company that the Naugatuck Valley manufacturers succeeded in 1907 in breaking the price of copper when it had reached the 26 cent stage. Naugatuck Valley uses a large share of all the world's copper, and hundreds of thousands of pounds are bought yearly by the Brass Company, the Randolph-Clowes Company, the Scovill Company, and the Chase concerns.

It has been figured out by a local copper expert that the American copper producers lose about three cents a pound through competition and that this could be saved, by combination, on a total of 800,000,000 pounds, making a total of $24,000,000 to be capitalized. By a ten per cent. curtailment of production it might be possible to control the market price so that it could be gradually advanced to between 15 and 16 cents a pound Just as much copper at 16 cents is consumed as at 13 cents and a stable market is desired by all manufacturers but an increase of two or three cents would create a new price schedule for every brass factory here. The contracts of practically all local concerns are estimated from 13 cent copper.

Another matter of national interest is the corporation tax law and according to Deputy Revenue Collector John M. Brewer, the corporations in this district are in no hurry to submit the data the government seeks. They are not defiant or indifferent, but are getting every iota of information as to their rights and the requirements of the law first. Afterward the collector will get his figures if they decide to give them out. Returns are to be secured from all corporations according to Mr. Brewer, whether they will be taxed or not.

It is an opportune time to introduce these matters as with orders pouring in and prospects bright for a steady run not only through the holidays but up to next spring with but slight decrease, if any, in the speed, there is less time to worry over unwelcome features. Yet the future is not being neglectel.

Waterbury manufacturers are awaiting with interest the outcome of the complaints against the Adams Express Company by Bridgeport and New Haven associations on account of alleged excessive charges. The Interstate Commerce Commission has the complaints.

In the cities and towns outside of Waterbury the conditions industrially are proportionately bright. In Thomaston the Seth Thomas Clock Company is hard pressed to catch up with orders and the Plume & Atwood plant, like its Waterbury sister, is singing a song of good times. The Torrington factories are all busy. Winsted reports satisfactory conditions and in Naugatuck, Derby, Seymour, Ansonia and Shelton the metal working factories are rushed in almost every instance.

Collections are good and foreign business is rising gradually. —F. B. F.

PROVIDENCE, R. I.

DECEMBER 6, 1909.

Conservative men in manufacturing jewelry centers are unanimous in the statement that the year just drawing to a close ranks up well beside former years in the amount of business transacted. The effects of the panic were felt to be sure but the results were far less disastrous than were feared at the opening of the year. Taken as a whole the year is fully up to the average of the past decade.

The jewelry interests in this section believe that present conditions indicate a rushing business in the near future. Salesmen representing the various firms opened at the first of the month their new lines in the Middle West and returns within a few hours showed increased buying for the spring trade.

The first information of renewed life in the industry came from Cincinnati. Jobbers in that city placed larger orders than usual for this season of the year. From that city the travelling men work their way westward to Indianapolis, Chicago, St. Louis, Kansas City, Omaha and the Northwest.

Cincinnati buying is the trade indicator. Men in the Far West start in at Denver and work to the coast. It is too early to get their first reports but the drummers report a bright outlook.

Large jewelry buyers from all parts of the country are in town at the present time placing orders for spring delivery. All the hotels of the city are crammed full of the buyers. The real buying has already set in and sufficient large orders have already been placed to indicate a prosperous season for the manufacturing jewelers of this city and the Attleboros.

The drummers have particularly handsome lines to show for the spring trade. Manufacturers have gone ahead with the idea that they were to do a good business and have expended large sums getting out the tools for their samples.

Rhode Island manufacturing jewelers are manifesting a great degree of interest in the proposition to hold a State exposition in this city at the time of the Atlantic Deep Water Ways Convention which is to be held here next September. The plan to hold the exposition originated with the Providence Board of Trade and a conference of leading officials and the representatives of the leading industries of the State has been called to consider the project. If such a course is decided upon it is expected that the manufacturing jewelry exhibit will be one of the largest and most complete ever shown in this country. President Taft and Andrew Carnegie have already announced that they intend to be present at the session of the convention.

Manufacturing jewelers in Providence who use pearls on wires in their products have been hard hit by an action of the Treasury Department setting aside the 20 per cent. ad valorem duty on pearls on wires which was being imposed here and increasing it to 60 per cent. ad valorem. The increase strikes harder at Providence and Attleboro than at any other cities in the country, for the manufacturers in these two places are almost exclusively the users of this form of pearls.

The past year has not brought as great a proportion of new capital into the manufacturing jewelry industry as in the years directly preceding the panic but a number of small concerns have entered the field.

Among the companies which have constructed new factories during the year are the Metal Products Company and the Improved Seamless Wire Company. The former building is 200 by 80 feet and has two wings, each 80 by 60 feet. There is also a storage building, 122 by 50 feet. A second story was erected on the front portion of the building to be used for office purposes. The total floor area is approximately 35,000 square feet.

The Improved Seamless Wire Company has just taken possession of its fine new factory building at 775-783 Eddy street. It is an extensive structure built of brick and reinforced with steel. It fronts 110 feet on Eddy street and is 110 feet deep. It contains fully 20,000 square feet of floor space. There is a rolling department, two annealing departments, pressroom, tubing and machine department, melting department, plating room, stock and storerooms.

In Attleboro, Mass., Albert S. Ingraham has erected a five story brick building on Union street. The building is fully occupied, the Ingraham Company having the basement floor. The new Tappan building on Maiden lane is of reinforced concrete construction. The building is 150 by 40 and three stories in height. The Leach & Garner Company completed a few weeks ago a fine building, 180 feet long and three stories in height. At the present time the Frank Mossberg Company is erecting a series of buildings a mile south of the center of town.

The residence of Thomas G. Frothingham, a well known manufacturing jeweler of North Attleboro, Mass., was damaged to the extent of $10,000 recently by a fire which broke out in the domestics' quarters on the third floor. The loss is covered by insurance.

Harry L. Tooker, foreman for the C. H. Eden Company, Attleboro, Mass., manufacturing jewelers, was seriously burned recently by an explosion of gasoline while repairing an automobile. The explosion hurled him 10 feet. He was attended by a physician and then taken to his home.

Patrick J. Cummings, an Attleboro, Mass., manufacturing jeweler, has been summoned before the United States court on a charge of using the United States mails in a scheme to defraud. He was taken before United States Commissioner Hayes in Boston and pleaded not guilty. He was allowed to go to his home. A. R. Gray of Breensborough, N. C., who is the complainant, alleges that Cummings advertised in the name of his company to give agents who would handle his jewelry $150 a month and their expenses. The P. J. Cummings Company is a large concern at Attleboro and has manufactured chains and a general line of jewelry for several years. Mr. Cummings recently assumed entire control of the company by purchasing the interests of two other partners. He has been a resident of the town for many months.

The jewelry plant of the S. & B. Lederer Company closed at noon on the occasion recently of the funeral of William U. Lansing, for the past 30 years connected with the company and its secretary at the time of his death. Among the numerous floral tributes was a handsome mounted piece from the employees of the S. & B. Lederer Company.—E. S. U.

BUFFALO, N. Y.

DECEMBER 6, 1909.

There was a continued and satisfactory improvement in the metal industry here last month and business was said to be better than at any time this year with bright prospects that 1910 will be a record breaking year with the local houses. All factories were rushed with orders and the heads were found busy preparing quotations to the trade.

Local automobile concerns are operating full time and report phenomenal business on cars for next season. Additions to several plants are planned to keep pace with the rush and in general there is a feeling that conditions are surely close to normal again.

All the brass and aluminum factories are employing more help than three months ago. They are receiving a variety of small-sized orders from all parts of the country with requests to hasten deliveries. The road men send encouraging reports. Collections are good.

A brass rolling mill that was constructed by the Buffalo Copper and Brass Rolling Mills on the Military road was opened last month and the manufacture was begun of brazed brass tubes, rods and sheet brass. About 25 more men were put on by this addition. C. F. Alward, secretary-treasurer of the company, says that they are operating on full time and getting large orders, mostly from out of town, for materials. In all cases haste is desired in deliveries. In its issue of Nov. 21. the Buffalo Express gave a splendidly illustrated article of the workings of this plant.

The Lumen Bearing Company, which manufactures machinery castings, added a chemical laboratory last month besides refitting and enlarging its foundry. The laboratory is 50 feet by 100 feet and is fireproof. Manager Barr reports plenty of orders and his plant running to capacity.

The Zero Brass and Valve Company is turning out rush special brass work. This concern is an active bidder on brass work in local downtown buildings. Its Chicago street plant is running full time and business has not been so good this year. It has a big call for auto fittings.

The Riverview Metal and Bronze Company, recently incorporated, is putting up a foundry at Niagara and Gull streets that will be ready for operation this month. The building is costing about $10,000 and enough property has been bought for additions.

There is much building going on downtown that calls for brass and plated materials and the supply houses have noticed the benefits of the boom. Orders from surrounding towns are also increasing in size.

An effort has been made to get the Page Hersey Iron Tube and Lead Company, Ltd., to locate its new plant at Bridgeburg, Ont., instead of at Welland, Ont., and thus prove a benefit to Buffalo.

Fries & Company, brass finishers, is busy on special brass work and automobile fittings. Its plant is running to capacity and conditions are satisfactory.

Hardware houses report a call for art metal novelties and the business in these ornaments will be big this month. it is expected.

The jewelry houses report a healthy increase in their ring and stick pin trade over a year ago. There is also a good demand for cheap articles of jewelry with the retailers.

Judgment has been awarded in favor of the Robson Smelting Company, for $49.30. Joseph Kuklinski and John F. Oswald were the defendants.

J. M. Shevlin, plating works at 78 Oak street, sustained a damage of $500 due to a carbon explosion on Nov. 17. He is secured with insurance.—F. M. A.

DETROIT, MICH.

DECEMBER 6, 1909.

The brass industry in Detroit during the past year has been one of great prosperity and the indications for the future are even more encouraging than have been those of the past. Never before has manufacturers in this industry seen such advancement in every branch of the business.

The year opened with encouraging prospects, notwithstanding the fact that various other cities were struggling with adverse conditions as the result of the dull period that had been prevalent for a year or more previous.

Detroit however passed through these discouraging times with little or no fear of a let up in business. This was all due to the great boom in the automobile business that has been on in this city for the past two years. At the present time thirty of these concerns are now prosecuting a vigorous business in Detroit. Many however devote their attention to the manufacture of auto parts. These in a large measure consist of various brass and aluminum articles.

John J. Whirl, secretary of the Manufacturers' Association, in discussing the condition of trade declared emphatically that the automobile industry saved Detroit from a great slump of business. For a few weeks during the early part of the year brass and aluminum men were experiencing an extremely disagreeable time. Everyone predicted a slump in the automobile trade and as a consequence the brass factories and aluminum manufacturing establishments would suffer.

The weeks progressed and instead of a slump, conditions began to boom as they never did before. New automobile factories began to locate here and in suburban towns, and as a result the brass and aluminum business began to thrive. Every automobile concern in the city in order to keep up with the orders that began to pour in, built additions to their plants. Some of the larger institutions like the Packard and Cadillac established brass and aluminum plants of their own. It was found impossible, however, to secure sufficient men to meet the demand and now these plants with scores of others, are forced to secure a large per centage of their brass and aluminum from concerns located in different parts of the city. These plants are scattered in every direction. Many are fifteen to twenty miles apart and it is necessary to deliver the products to the automobile factories by freight over belt line tracts.

During the past month one of the greatest brass consuming concerns in the world has been located in Detroit. It is the main plant of the General Motor Company, that is buying up all the automobile factories it can secure. This new plant will cover nearly fifty acres and is to be located in the northeastern part of the city. It will require two years to erect the factories. Several squares of real estate has been purchased and the work of erecting the plant will begin in the spring, as soon as the weather is favorable. Already the heavy task of moving a hundred or more dwellings is about to begin.

This enormous plant of the General Motors Company will manufacture principally automobile parts. This of course includes the brass and aluminum products that go to construct a high class automobile. This factory will give a great impetus to the brass industry in Detroit.

The brass and aluminum industry in Detroit has every indication of a prosperous year. Besides the automobile factories that take a large quantity of the output from the Detroit brass and aluminum factories, there are concerns that manufacture

various other brass and aluminum articles. A firm trade in these lines is reported, and during the past year every factory engaged in the business has been running to its capacity.

The manufacture of trolley wheels has been unusually brisk during the past year. Probably one-third of this product used in the United States and Canada is produced in Detroit. The trolley wheels are manufactured from solid brass, and during the past year the street car companies throughout the country have placed large orders with the Detroit firms.

The manufacture of plumbers' supplies also has been brisk. Great quantities of these goods are produced here. Whenever this industry becomes dull however, the factories turn their attention to the manufacture of automobile parts and as a result there is no laying off of men or closing down of factories.

During the past six months the Allyne Brass and Foundry Company has absorbed three large factories in Detroit. The object of this is to increase the output and at the same time centralize the business. This firm manufactures 90 per cent. of the aluminum parts used on automobiles in this country. The trade is enormous in the Detroit field. At the same time it produces 50 per cent. of the brass goods manufactured for the automobile trade.

At the present time this company is building an enormous factory on Chene street in this city and expects to occupy it by Feb. 1. It will then increase its help to two thousand men. At the present time it employs one thousand. This firm like all others in Detroit has had a great run of business during the past year and is preparing to double its output during the coming year. Brass and aluminum manufacturers in Detroit as a rule are enthusiastic over the outlook. The past year has been one of great prosperity for them.

The Detroit Valve & Fitting Company is a new brass concern to locate in this vicinity. This firm is about to erect a large factory at Wyandotte, a suburb of Detroit. The plant will occupy a site covering 20 acres and will be modern in every respect. As an inducement to locate in Wyandotte the city agrees to furnish water free and exempt the concern from taxes for eight years.—F. J. H.

CLEVELAND, OHIO.

DECEMBER 6, 1909.

As the close of the year approaches the various metal industries in Cleveland find themselves in better shape than in the past twenty-four months. Every factory is humming with business, orders are coming in with persistent regularity and every indication points to one of the busiest winters in the history of the trade here.

The automobile industry is particularly busy. Plans are completed for the 1910 models and already many concerns are manufacturing stock in anticipation of a big business next spring. The brass foundries and plating establishments in connection with the big factories here are all working to capacity and in several instances are being enlarged to take care of increasing business.

The building season has developed into a remarkably good one and as a result the big concerns here engaged in the manufacture of plumbing goods are very busy. Cleveland ranks as one of the leading producers of this line of goods in this country. New developments in sanitary arrangements are constantly appearing, buildings are being uniformly equipped with modern plumbing devices and the manufacturers find their business constantly expanding.

Trade is good with the manufacturing jewelry houses. With the holiday and gift season approaching the manufacturers find it difficult to keep pace with the demand for special goods of all kinds. Art jewelry has taken such a hold that several concerns are devoting their attention to that line quite extensively. Several of the brass spinning shops here report a big call for brass and copper ornaments while the big stores are helping the business by booming Brass Craft, by selling patterns in brass and copper, which may be beaten or stenciled.

The general brass business is reported by the foundry men to be thriving. Commercial work is running heavy while the work on novelty goods is also brisk. The commercial platers say they are busy and expect the winter season to be one of the best experienced in recent years.

An exquisite bit of work is being installed at the new Federal building by Gorham & Company, silversmiths. It includes several long sections of an unusually massive bronze fence about the area ways on Superior avenue and the Public Square sides of the new Monumental building. Huge supporting posts of simple design are placed every eight feet. Connecting rails carry large round spindles, surmounted by big balls. The railing stands about four feet high.

The Bishop & Babcock Company, manufacturers of fancy soda fountains, and a variety of brass and copper goods have leased a store in the Masonic Temple on Superior avenue where they will open a retail display room showing their soda fountain apparatus and other goods.

As the result of a bad storm on Nov. 17 in Cleveland the brass foundry belonging to J. A. Cochrane on E. 40th st., near St. Claire avenue was wrecked by the falling upon it of a heavy wall of a new Catholic school which was being erected on an adjoining lot. The damage to the plant has been estimated at about $10,000. The roof was caved in and a quantity of machinery ruined. Business has been suspended at the foundry since.

W. R. Warner of the firm of Warner & Swazey, manufacturers of large telescopes and fine optical goods gave an address during the past month on "Apprentices" at the meeting of the Metal Trades Superintendents and Foremen's Club. Mr. Warner commended the educating of apprentices on broad lines so they might realize the importance of their calling and eventually be enabled to earn good profits for their employers.

Specifications have been completed for the hardware for Cleveland's new $4,000,000 county courthouse. Bids will be let Dec. 15. The big hardware manufacturing concerns of the country have been asked to submit samples and later, their bids. The building will be elaborately decorated throughout with high grade goods.

The Electric Welding Products Company is erecting a large addition to its plant on Clarkwood Road. Six new furnaces have been added, giving the firm probably the largest annealing plant in the State. Two large biuldings are being erected to care for the rapidly increasing business.

The Standard Brass Company has purchased a lot fifty by 150 feet in size on Central avenue for the sum of $7,250 and has had plans prepared for a new factory building to be erected at once.

The White Sewing Machine Company has announced that it will build and equip a new $500,000 plant in connection with the plant of the White Automobile Company. The new factory will be 360 by 490 feet in size and the roof will be of sawtooth construction. An office building will be erected in connection with it. The new quarters are to be ready for use by July 1 of next year. The company maintains brass and plating departments on a large scale. The present plant turns out 400 sewing machines a day. The new one is planned to produce 1,000 machines a day. The White sewing machine is one of the oldest in the country.—S. L. M.

NEWARK, N. J.

DECEMBER 6, 1909.

Manufacturers of this city are much pleased by the announcement made, by the Pennsylvania Railroad, this week that the new high speed electric line to New York would start from Saybrook place, and Center street. This will bring the heart of Newark within twenty minutes of Broadway, New York. To the down town dealer in machinery and supplies it will be of incalculable value for he can go directly from his office and salesroom to the factory; almost without going out from under cover. The makers of jewelry in this city will be the greatest beneficiaries for their business in New York is near the Cortlandt street terminal of the tube and many of their factories here are in close proximity to the new terminal.

Making castings of Monel Metal is one of the new industries of this city. The Riverside Steel Casting Company, Riverside avenue, has recently been appointed by the Orford Copper Company, Exchange place, New York City, an agent to do this work in the State of New Jersey. This natural alloy of copper, nickel and iron is fast becoming one of the important non-ferrous metals. The government has been specifying it for a number of different uses on warships and automobile makers are ap-

preciating its advantages. The castings the government are now buying will require an unusual amount of machining. In the proposals asked for on some recent contracts the founders were required to bid on the scrap or metal removed in the machining. The automobile makers are much pleased with the luster of the work and the way the metal stands up under strain. The fact that no plating of any kind is required is another decided advantage. One maker when told of its wonderful properties and comparative cheap price expressed the fear that the supply would soon be exhausted, but the sales manager of the company reassured him that no such catastrophe would befall users of it in this generation.

The Miller Metal Work Company has recently started operations at 401-411 St. Paul's avenue, Jersey City, N. J. They will make a specialty of brazed brass tubing and bending tubes of brass and other metals to the required shape.

The vacuum cleaner makers of Newark, of which there are several, have been among the busiest of any users of brass. The industry has grown with leaps and bounds and one factory which was only started a year ago is now turning out a hundred of the machines a day and, moreover, is constantly enlarging its working space. The number of parts to such machines is not great but they are all of special design so the maker of the machine must practically furnish everything from the ground up.

Loy & Newrath, Runyon street, this city are among the best known makers of power presses in the country. They have recently made some very large presses and a short time ago had three 55,000 pound machines, at various stages of manufacture on the floor. They are preparing to make a 75,000 pound press some time this winter.

Some fortunate manufacturing jewelers are congratulating themselves for a double reason. They are especially prepared to make platinum work and this is in remarkably good demand. More to the point, however, is the fact that they purchased their supplies of the raw material last spring when it was down under $25 an ounce. Recently the market advanced rapidly and some, who did not buy early are paying at least $35 for such material as they need.

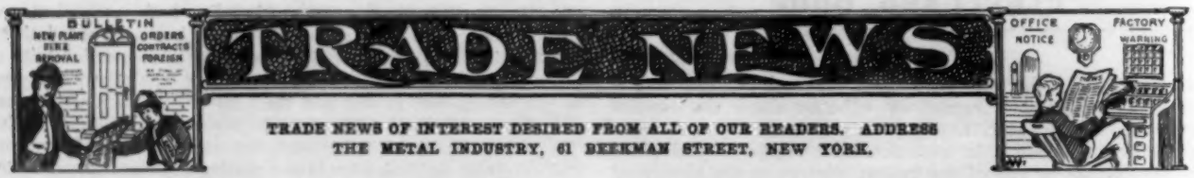
Chambers & Company, have recently enlarged the scope of their brass foundry work. They are now making special articles for the plumbing trade. A new departure, in this line of work, is a "press the button" cock. It really acts on the principle of a flushometer for it only allows a certain amount of water to flow into the basin at each operation. This brass foundry being one of the best equipped in the city of Newark it was not necessary to buy any additional machinery.

A new departure in the making of insulated wire is being tried in this city. The thing has already passed the experimental stage and the product is being marketed in a commercial way. The wire is first covered with a layer of cotton batting and the remainder of the insulation is woven over this. It possesses peculiar advantages in the fact that the resulting product is more flexible. The makers, The Excelsior Insulating Company, Runyon street, have made some large shipments of this material. —R. T. C.

BRISTOL, CONN.

DECEMBER 6, 1909.

Business in Bristol was never better. The New Departure Manufacturing Company are running 23 hours a day. The Birge Stockinet Company are running 13 hours a day. The Sessions Clock Company and Ingraham Clock Company are both running 13 hours a day for four days a week, balance 10 hours. The Wallace-Barnes Company are running 13 hours for five days, balance 10 hours. The American Silver Company is running full force 13 hours a day for five days a week, balance 10 hours. The Sessions Foundry Company are unable to keep up with their orders, although working to their full capacity. The Bristol Brass Company have more work at the present time than they ever had in the history of the company. The W. L. Barrett Company and The E. Dunbar Company, and in fact every other factory in the town, are working and turning out all the work they possibly can.—W. B.



TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

The Crescent Wire and Iron Works, 62 King street, West Kingston, Ont., Canada, have recently added a plating department to their works.

The Allyne Brass Foundry Company has recently let the contract for a new plant at Buffalo, N. Y., which will be a duplicate of the new Detroit foundry.

News has been received of plans to greatly augment the plants of the Russell Erwin Mfg. Company of New Britain, Conn., and the New Britain Machine Company.

During one week in November, 3,540 cars were handled in the Waterbury, Conn., freight yards, 1,703 incoming and 1,837 going out. Nearly all were for or filled by local manufacturers.

The factory of R. B. Seidel, Inc., 1334 Callowhill street, Philadelphia, Pa. is now running overtime and the concern is planning to put up another building to give them the required additional room.

In Woodbury, Conn., a new concern, the Standard Lock, Nut and Bolt Company, has acquired the Curtiss mills property and is selling stock among the townspeople to raise capital to start a new factory.

The Cleveland Plater's Supply Company, Cleveland, O., announce that the number of customers using their electric cleaning compound has increased from 47 on Nov. 1, 1907, to 431 on Nov. 1, 1909.

The Columbus Brass Company, of Columbus, Ohio, have secured a new foundry on Dublin avenue for the manufacture of "Columbus" flush tanks. The building, together with five acres of ground, represents an investment of $50,000.

The Empire Metal Company is the name of a new concern which has taken offices in the Hudson-Terminal Building, 30 Church street, New York, in order to deal in metals. C. V. Freeman and I. J. Louis comprise the company.

The Tabor Manufacturing Company, of Philadelphia, Pa., builders of molding machines are doubling their floor space. They will move their carpenter, pattern and erecting shops into new quarters, using this space for their machine shop.

R. B. Seidel, Inc., crucible manufacturers of Philadelphia, Pa., have started an addition to their plant by the erection of a two story building 60 x 14 feet which will give them 1680 square feet more room to take care of their increasing business.

The Abbott Ball Company of Hartford, Conn., manufacturers of steel balls for burnishing metal goods by tumbling, have sold all the rights for the manufacture of the Abbott Tumbling Barrel to the Globe Machine & Stamping Company of Cleveland, Ohio.

The Turner Machine Company, 2049 North Second street, Philadelphia, Pa., manufacturers of sprue cutters, automatic cock grinders, molding machines, sand sifters and other machinery

report their works very busy and excellent prospects for the new year.

The Wetherill Finished Castings Company, of Philadelphia, Pa., have taken out a permit for an additional building to be used for a shipping room. The company are manufacturers of finished castings in various metals and do a large amount of automobile work.

J. H. Jolley & Company of Philadelphia, Pa., agents for and sellers of all kinds of ingot and sheet metals have decided to establish in Philadelphia a plant for the manufacture of small sized tubing. They will thus become manufacturers of some of their own goods. It is expected to have the plant ready sometime next year.

The Standard Brass Aluminum Foundry Company, of Cleveland, Ohio, brass and aluminum founders, have bought property joining their present factory constituting 50 x 200 feet. The intention of the company is to build foundry buildings on the premises which will increase their aluminum department to three times its present capacity.

Robert H. Ingersoll of the Ingersoll Watch firm, whose cheaper watches are produced by the Waterbury Clock Company, Waterbury, Conn., is sending out circulars calling attention to the advances in watch prices, made since the Payne tariff became effective, by American concerns. His firm has refused to join the movement, he claims.

The National Bronze and Aluminum Foundry Company, of Cleveland, O., have just finished making a large addition to their plant which doubles their capacity. They have also greatly increased their furnace capacity and their foundry is now fully equipped for handling all sorts of high-grade brass, bronze and aluminum castings or automobiles.

Within the past month the Waterbury Machine Company, Waterbury, Conn., shipped a wire block bench assembled completely on the freight cars, which weighed 48,000 pounds and is the largest ever shipped, except in sections, by this company. It took five months to build the bench, which is for the Detroit Brass and Copper Company, of Detroit, Mich.

Wm. Schrimpt, president of the Adelphi Silver Company, manufacturers of sterling silver ware, fine cut glass silver mounted, Pearl and Prospect streets, Brooklyn, N. Y., announce that after Dec. 31, they will discontinue the sterling branch. It is their intention to devote all their energy on silver plated hollow ware, Sheffield ware and fine copper goods.

Lewis Thompson & Company, Philadelphia, Pa., whose special grade mahogany pattern lumber is now used extensively in many pattern shops, state that the demand for their product is steadily increasing, foundrymen as a rule being quick to realize the advantages of this mahogany over other woods for this purpose, especially as its cost is no higher than that of white pine.

The Cutter, Wood & Stevens Company, 68 Pearl street, Boston, Mass., manufacturers of foundry and plating supplies have changed the style name of the corporation to Cutter & Wood Supply Company. Owing to their increasing business they have been forced to increase their facilities. They report a brisk business at this time and the prospects for the coming year are very bright.

The C L. Constant Company, analytical chemists and assayers, are now occupying their new laboratories at 42 New street, New York, where they have every modern facility for assaying and analyzing metals, drosses, furnace products and ores. This firm acts in an advisory capacity in all matters pertaining to metallurgical processes, and renders valuable services to its clients in many ways.

The Homogen Department of the Allyne Brass Foundry Company, with the main office at Cleveland, Ohio, and branch plants for making castings in other cities, report that during the month of October they sold 11,000 pounds of Homogen and that in November their sales will be over 22,000 pounds. Homogen is called "A Metal Scavenger," its object being to remove iron from brass mixtures and also give sound castings. It was described in the September number of THE METAL INDUSTRY.

The Alliance Brass and Bronze Foundry, which was started in Alliance, Ohio, last February, have increased their business to such an extent that they are in need of more room and more capital to expand. With these facts in view they now have under consideration the incorporation of the company and expect to build a large building to accommodate their growing trade in the near future. The company manufactures all kinds of brass, bronze and aluminum castings and also metal pattern work.

As a result of the conviction, at Waterbury, Conn., of Samuel A. Alderman, a New Haven junk dealer, of receiving nearly $800 worth of copper stolen from the Benedict & Burnham plant of the American Brass Company and the Chase Rolling Mill Company, the police of Waterbury, Conn., believe they have temporarily ended copper thefts hereabouts. The thieves are in jail awaiting trial, some having turned Staat's evidence against Alderman. The copper has been returned and watchmen in the railroad yard now inspect cars containing such cargoes three times daily to better protect property in transit.

The Utica Aluminum and Novelty Works, Utica, N. Y., manufacturers of aluminum and sheet metal novelties, have enlisted new capital and with the new modernly equipped plant into which they have just moved, they expect to go into the aluminum business in a much more aggressive way. They have plans under way for the installation of a complete rolling plant and also do some work in casting. They have recently opened an export office with connections on three continents and this, with a greatly increased force of local agents, is giving a very pleasing volume of business.

The Jonathan Bartley Crucible Company, Trenton, N. J., report that their business has increased to such an extent that their large new manufacturing plant is already fully occupied and it is only a question of time when additions to the buildings will be required.

They recently installed, at a cost of several thousand dollars, a system of utilizing exhaust steam for heating purposes, which has proved very successful. The heat is distributed throughout the buildings very uniformly and the even temperature maintained is found to be very beneficial to the crucibles during the period of drying out previous to burning in the kilns.

R. F. Lang, 31-33 Broadway, N. Y., has recently returned from his annual trip abroad. Mr. Lang reports that the works which produce the celebrated "Royal" brand of metals are running overtime and that especially Royal phosphor copper and Royal manganese copper are in great demand. For the latter metal large contracts have been taken from the Krupp Works at Essen, the Imperial Navy Yard at Kiel and the great shipbuilding concerns on the North Sea and the Baltic.

The demand for this metal is constantly increasing, the advantages of making manganese bronze ready at once for pouring being more and more appreciated and understood.

Mr. Lang publishes descriptive literature regarding the Royal Metals which is sent, to those interested, on application.

The Tallman Brass Company, Hamilton, Canada, which occupied quarters on Wellington street for 13 years, have opened up their large new factory and foundry on Wilson street, and are quickly getting down to hard work to execute the many orders they have on hand for the winter trade. Tallman Brass Company manufacture the well-known Arctic metal, and in their new establishment have more than doubled every branch of their business. The Arctic metal department has been increased to four times its previous capacity. The metals used by this firm are imported direct, and the company does a fine jobbing business in tin and lead, copper and aluminum ingots and antimony. Brass castings are a specialty and the installment of new and up-to-date machinery and equipment enables the company to turn out orders in quick time in the best of style.

The Hanson & Van Winkle Company, of Newark, N. J., manufacturers of platers' supplies, make the following announcement through their treasurer, R. D. Foster:

"Our attention has recently been called by a number of

concerns to the fact that a person who purports to represent the Consolidated Plating Company of Newark, N. J., and Racine, Wis., and who also claims to have connection with our own company, is selling or attempting to sell a liquid for plating nickel by a dip process. He has succeeded in making sales in some instances, and the buyers have learned that they have been swindled. We wish to say that we have absolutely no connection with any person or any concern of this sort, and that we do not sell a material by which an article can be nickel-plated by a dip process."

The United States Aluminum Company, a subsidiary to the Aluminum Company of America, with headquarters at Pittsburg, Pa., have leased the former Sims-Kent foundry plant on Salem street, Dover, N. J., for the proposed carrying on of their business.

The goods, powdered aluminum, this concern will make are the first of the kind to be manufactured in this country, and if it is as successful as they anticipate, it will not be long before the works in Dover will have to be enlarged and improved. Already they have put in a lot of machinery, shafting and so on, and expect to commence operations by the end of December. The Dover concern is in charge of Karl Huth, former superintendent of the Boonton Bronze Works, Boonton, N. J.

The Riverview Bronze & Manufacturing Company, of Buffalo, N. Y., has been incorporated with a capital of $50,000 to manufacture manganese, phosphor and aluminum bronze, red and yellow brass castings. The officers are: President, P. F. Woods; treasurer, R. P. Deardorff; and secretary, Wm. R. Mample. The new concern has purchased a tract of land 85 x 225 ft. on Gull street, between Niagara street and the New York Central Belt Line tracks. Two buildings will be erected on the premises, one 50 x 60, and the other 50 x 96 ft. and will be constructed of concrete and galvanized iron. Of the management Patrick F. Woods has been proprietor of the Model Pattern Shop for the past few years and is well known in all pattern and foundry shops throughout the city, being a first class pattern maker and foundryman. Ray P. Deardorff was superintendent of the U. S. Headlight Company and has been connected with the General Railway Signal Company and the George N. Pierce Company as general manufacturing foreman. Wm. R. Mample has been the superintendent of the Allyne Brass Foundry Company for the past five years and is well known as a skilled foundryman.

GOVERNMENT REQUIREMENTS.

Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until 10 o'clock a. m., Dec. 21, 1909, and publicly opened immediately thereafter, to furnish at the navy yard, Puget Sound, Wash., a quantity of naval supplies, as follows: Sch. 1990: Lead pipe, sheet lead; Sch. 1994: sheet brass, sheet copper. Applications for proposals should designate the schedules desired by number. Blank proposals will be furnished upon application to the navy pay office, Seattle, Wash., or to the Bureau.

E. B. Rogers,
Paymaster-General, U. S. N.

REMOVALS

The Utica Brass Works, of Utica, N. Y., manufacturers of all sorts of gas and electric light fixtures, have purchased a four-story building at 52 Liberty street, in that city, which will give them double the space that they at present occupy. With this increase of facilities they will be enabled to more easily care for their rapidly expanding business. The construction of a modern and complete plant is now under way and no expense will be spared to make it up to date in every particular.

FIRES

The silver plating works of Lawrence Brothers, Sterling, Ill., manufacturers of hinges, etc., was totally destroyed by fire on Nov. 5. The loss was between $35,000 and $50,000 which is fully covered by insurance. A large force of men are at work rebuilding and the new plating plant is expected to be completed and in operation at an early date. The fire did not reach the main factory and no machinery was destroyed.

The drop forge shop of Kraeuter & Co., manufacturers of tools at 571 18th avenue, Newark, N. J., which was entirely destroyed by fire Oct. 15, causing a loss of $35,000, is being rapidly rebuilt. The president of the company, Arthur A. Kraeuter, writes us that they have contracted for a new reinforced concrete building, and are rapidly cleaning up the debris, and will be in a position to ship their finished stock very shortly. About $50,000 worth of finished tools were soaked with water, but were not damaged by rust.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Correspondence" columns.

The Fielding Brass Company, of Charlotte, N. C. Capital, $20,000. Incorporators: Walter Fielding and Lawrence Hager, both of Charlotte.

The Yardly Pearl Works. Manufacture Jewelry. Providence, R. I. Capital $10,000. Incorporators: Arthur Yardly, Chas. P. Thompson and Wm. E. Hammond.

The Frankfort Brass Manufacturing Company, Frankfort, Ind.; to operate a brass foundry; capital, $25,000. Directors, J. A. Johnson, G. A. Burgess, G. L. Wire and F. L. Tuttle.

The Vanadium Metal Company, Camden, N. J. To deal in metals of all kinds. Capital, $300,000. Incorporators: V. A. Murray, H. G. Elliott, K. V. Muler, all of Camden, N. J.

The Mechanical Devices Company, Albany, N. Y. Capital, $35,000. Directors: Julius W. Walters, of Glens Falls; Ralph H. Davison, of Saratoga Springs; Leon L. Tripp, of Albany.

Keystone Scrap Iron and Metal Company, Camden, N. J. To deal in brass, iron, copper, etc. Capital, $10,000. Incorporators: F. R. Hansell, George H. B. Martin and John A. McPeak, all of Camden.

Buffalo Foundry Supply Company, Buffalo, N. Y. To manufacture foundry facing and core-wash. Capital, $20,000. Incorporators: Harry Heinsheimer, Marc Heinsheimer, Jay C. King, all of Buffalo, N. Y.

The Bell Findings Company. To manufacture findings and novelties. Attleboro, Mass. Capital $10,000. President John C. Bell; treasurer, James H. Collingham, and stockholder L. W. Pietzer, all of Providence, R. I.

High Grade Metal Company, Brooklyn, N. Y. Manufacturing castings of every metal. Capital, $50,000. Incorporators: William C. Milner, Bertha O. Duck, Blanche E. Phillips, all of 392 Greenpoint avenue, Brooklyn.

N. B. Nickerson Company. Jewelry. Providence, R. I. Capital, $50,000. Directors: Nehemiah B. Nickerson, L. A. Benoit and O. P. Hammill, all of Providence. The company is formed to take over the business of N. B. Nickerson.

The Atlantic Plating Works has been established at 712-16 North Indiana avenue, Atlantic City, N. J., for the purpose of refinishing metals of all sorts, brass beds being a specialty. The management consists of Geo. B. Stoddard and W. A. Gardner.

The General Brass and Tool Works, of Nashville, Tenn., has been incorporated with J. H. Lawrence as general manager. The General works are now in the market for brass melting furnaces and light machine tools and would like to correspond with the various manufacturers of these supplies.

The Hobson Manufacturing Company has been organized at Winsted, Conn., for the manufacture of metal novelties, doing all kinds of britannia metal work, including plating, refinishing and repairing. William Hobson, who is president, is an expert die-sinker and molder. Walter Hobson, his son, who is associated with him in the company, is a designer and die-caster.

REORGANIZATION

At the annual meeting of the stockholders of the Light Manufacturing and Foundry Company, of Pottstown, Pa., held recently, the present board of directors and officers of the company were re-elected, as follows: Directors, E. S. Fretz, Frank S. Brant and E. R. Cassel; president and general manager, E. S. Fretz; vice-president, Frank S. Brant; secretary and treasurer, E. R. Cassel.

BUSINESS TROUBLES

The Susquehanna Metal and Manufacturing Company, manufacturers of metal novelties, located at Susquehanna, Pa., has gone into the hands of a receiver with John S. Courtright, as referee in bankruptcy.

DISSOLUTION

The partnership lately existing between Barney Covich and Max A. Daniel, of Boston, Mass., carrying on business as wholesale dealers in metals, rubber and iron at 411-413 Atlantic avenue, under the style of Covich & Daniel, has been dissolved by mutual consent. The business in the future will be carried on by Barney Covich alone, who will pay and discharge all debts of liabilities and receive all money payable to the firm.

PRINTED MATTER

METALLIC PHOSPHORO.—A flux for deoxidizing brass or copper is described in a sheet published by the New Era Manufacturing Company, Kalamazoo, Mich. This sheet gives complete descriptions for using this material and also contains a number of useful modern formulas for aluminum casting alloys, babbitts, brass, bronze, die casting alloys and German silver.

METALS, ALLOYS AND FLUXES.—The United States Alloys Company, of Baltimore, Md., have issued a 6-page folder describing the various alloys and fluxes manufactured by them. The list includes manganese, copper, manganese dioxide, silicon-copper, aluminum-bronze, ferro-silicon, ferro-manganese, and ferro-titanium, also various fluxes for brass foundries.

THE ALUMINUM GOODS MANUFACTURING COMPANY, Newark, N. J., have just issued Catalogue Number One. This company is the consolidation, as has been reported in THE METAL INDUSTRY, of certain manufacturers of Newark, N. J., Manitowoc and Two Rivers, Wisconsin and they maintain factories in all three places. They manufacture every known thing of aluminum including stationery articles, trays, thermometers, toilet, household, sporting and smokers' articles, picture frame, fancy, miscellaneous and souvenir articles, combs, brewers' supplies, castings, etc.

The catalogue is the largest of its kind ever published, consists of 132 pages and is 9 x 12 inches in size and enumerates and describes by cut and text an enormous number of aluminum articles from an ash tray to a golf club head. It will be sent upon request to the trade.

CATALOGUE H. of The National Tube Company of Pittsburg, Pa., has just been issued, which supersedes Catalogue G of 1905, embracing wrought pipe for steam, gas, water and air, cast, malleable iron and brass fittings, brass and iron body valves and cocks, radiators and coils, drive well points and well supplies.

It is a book of 470 pages, bound in black seal leather, with gilt edges and is most profusely illustrated with cuts of the various products manufactured by the company. The book also contains a specification and price list relating to all of the materials enumerated in the title. The portion of the catalogue devoted to the combination pipe fittings and valves shows these well-known "Kewanee" specialties by means of two-color cuts which are unique in themselves, the brass part being represented by yellow and the iron by black, so that it can be readily seen just what the composition of the article is.

AD NEWS

The S. Obermayer Company, Cincinnati, feature the Todd rumbler for cleaning castings in this month's advertisement.

The Aluminum Company of America fill an attractive page with their advertisement of aluminum ingots, sheets, rods, tubes, wire and other products.

The Potter's Kiln and Tool Works, Chicago, Ill., show a sectional view of the Kuehl Natural Draft Oil Burning Pit Furnace and call attention to some of its special features.

The Jonathan Bartley Crucible Company, Trenton, N. J., call attention in their advertisement to their "crucibles of quality" which are used by many prominent foundries.

The Eureka Pneumatic Spray Company, 276 Spring street, New York, include in their advertisement a very strong endorsement of their spraying process from a well-known manufacturer.

The card of the Merchant & Evans Company, Philadelphia, Pa., which is one of the oldest and best known metal houses in the country, appears on another page and contains a list of some of the company's specialties.

The Empire Brand brass and aluminum molding sand is advertised and sold by the Manufacturers' Supply House, Erie, Pa., who request foundrymen to send for samples and quotations before placing further orders.

The Northern Engineering Works, Detroit, Mich., whose jib and traveling cranes, furnaces, tumbling barrels, sand sifters, elevators, hoists, and other foundry equipment are used in many foundries, are now advertising their products.

The announcement of Lofgren & Armstrong, 803 Locust street, Philadelphia, Pa., should interest anyone requiring anything in the line of punch and die work, special and automatic machinery, sheet metal stamping by contract, or general machine work.

The New Era Manufacturing Company, Kalamazoo, Mich, call attention to "Metallic Phosphoro" which is phosphor tin improved and which is used effectively in preventing the formation of pores, blow-holes, cold shuts, and excessive shrinkage in castings.

P. Pryibil, Inc., is a name well known to many metal spinners and to make it still better known this firm has taken space in THE METAL INDUSTRY in which to advertise their spinning lathes and chucks, including their new self-balancing elliptical chuck, the only self-balancing chuck in existence.

"The only real reliable aluminum solder" is the statement this month in the advertisement of Janney, Steinmetz & Company, of Philadelphia, Pa. It is some fifteen years since Richard's Aluminum Solder first made its appearance and it has survived the various tests during those fifteen years and is today one of the few satisfactory aluminum solders. In 1896 the Franklin Institute of Philadelphia awarded the John Scott medal to Joseph Richards for his solder for aluminum.

The American Manganese Bronze Company, Holmesburg, Philadelphia, Pa., announce in this issue that they manufacture manganese bronze in the form of ingots, forgings and rods and also make the highest grade of bronze castings of every description. They make manganese bronze, phosphor bronze and Government compositions, also red brass. The quality of their ingots, castings, forgings and rods is guaranteed. Further particulars of their products may be found in pamphlet "M" which is sent for the asking.

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)

	December 10, 1909. Pounds.
Stock of marketable copper of all kinds on hand at all points in the United States, November 1, 1909	153,509,626
Production of marketable copper in the United States from all domestic and foreign sources during November, 1909	121,618,369
	275,127,995
Deliveries:	
For domestic consumption	66,857,873
For export	55,266,595
	122,124,468
Stock of marketable copper of all kinds on hand at all points in the United States, December 1, 1909.	153,003,527
Stocks decreased during the month of November	506,099

METAL MARKET REVIEW

NEW YORK, December 10, 1909.

COPPER.—The London speculative market in standard copper has been very active during the month of November, and prices have fluctuated to the extent of £3 per ton. Prices in that market advanced on persistent reports of the copper merger in America and with the news of the action by the courts against the Standard Oil prices for standard copper broke violently in the London market, and at the close the price for standard is about £1 per ton higher than a month ago.

In the New York market price for amalgamated rose to 96½, and the copper market advanced about one cent per pound on the strength of the reported copper merger, and when the decision was announced against the Standard Oil, the stock market broke in sympathy with the break in London, and the copper market eased off nearly ½ cent per pound.

In connection with the copper merger it is to be noted that the Lake companies are barred absolutely from any merger, and the interests that were to be included in this combine, as proposed originally, were the Guggenheim interests, including the American Smelting & Refining, the Cole-Ryan interests and the Amalgamated interests, and this combination is now being held back pending a final action by the Supreme Court in the Standard Oil case, and conferences in Washington.

The copper market has been very active, and consumers have been heavy buyers on the advancing market around the latter part of the month. Prices were advanced about one cent per pound; at the close the market is rather easier and prices are today about ¼ cent per pound higher than a month ago.

The exports for the month were 23,878 tons, making total exports so far this year 273,403 tons against 268,358 tons during the same period last year.

The foreign stocks in England continue to show heavy increase, and for the month of November stocks in public stores increased over 18 million pounds. The imports for 10 months were 114,500 tons, against 74,400 tons same period last year.

The market for standard copper on the New York Metal Exchange has been quite active, prices advanced over one cent per pound, but at the close the market is easier with prices about the same as a month ago. Standard copper, 12¾ to 13 cents; Lake, 13½ cents; electrolytic, 13⅜ cents, and casting brands, 13¼ cents.

TIN.—The London price of pig tin has been advanced £3 7s. 6d. per ton during the month, and the worst is not yet. Market opened at £139 7s. 6d., and closed at £142 15s., the highest price of the month.

In the New York market, prices have followed the advance abroad, and today tin in New York is bringing about 2 cents per pound over the price of a month ago.

The deliveries into consumption were large, amounting to 4,000 tons, this makes an increase of nearly 8,000 tons over the deliveries for the same period last year, while the shipments from the Straits during the same period were 2,870 tons less than in 1908. The total visible supply of pig tin has increased nearly 2,000 tons during the month.

The prices today are: Spot 5-10 tin, $32.60; futures, 5 to 10 points higher.

LEAD.—The foreign lead market holds steady at around £13 per ton.

In the New York market prices has ruled from $4.37½ to $4.42½, and at the close the market is firm with no disposition on the part of producers to sell futures or any deliveries beyond December at the present prices—lead is about the only metal that has not moved and the trade look for an advance before very long. New York delivery, carload lots, $4.37½ to $4.42½; East St. Louis, $4.20 to $4.25.

SPELTER.—The foreign spelter market, owing to the "gentlemen's" agreement has been held steady at around £23—to keep this price members of the combine have had to ship to America over 6,000 tons of spelter, and further shipments will probably have to be made to hold the foreign market.

In the New York market prices have sagged off slightly, but the market is in the hands of about three operators and the trade will have to pay the price. Carload lots New York, $6.20 to $6.25. In East St. Louis market is pegged by the Spelter Trust at 6.10 to 6.15.

ALUMINUM.—The market holds fairly steady at 22 to 22½ cents, according to quantity.

ANTIMONY.—The London market holds steady at £29 for Hallett's and £28 for other brands.

In the New York market prices are unchanged—$8.37½ for Cookson's and $8.12½ for Hallett's.

SILVER.—In London the price of silver has advanced about ½d. per ounce; closing at 23⅝d.

In the New York market prices show an advance of 1 cent per ounce. Opening at 50¼ and closing at 51¼.

QUICKSILVER.—The foreign market continues to advance and is about £1 higher than a month ago, closing at £9 15s.

In New York prices have been steadily advancing, showing today an advance of about £5 per flask; closing at $51.00 wholesale—$52.00 to $52.50 for jobbing lots.

PLATINUM.—Prices are higher at $29.50 for ordinary and $33.25 for hard.

SHEET METAL.—Copper wire and sheet copper have been advanced—wire to 15¼ base, and sheet copper to 18 cents base. Brass rods, sheet and wire is now 14 cents base.

OLD METALS.—The old metal market is very dull, but prices are higher than a month ago. Consumers are only buying for immediate needs and the outlook is good for better prices.

WATERBURY AVERAGE

The average price of lake copper per pound as determined monthly at Waterbury, Conn.

1909. Jan. 14⅜ Feb. 13¼ Mar. 12⅞ April 13 May 13¼ June 13½ July 13½ Aug. 13½ Sept. 13¼ Oct. 13⅛ Nov. 13⅝

THE NOVEMBER MOVEMENTS IN METALS

COPPER.	Highest.	Lowest.	Average.
Lake	13.75	13.00	13.50
Electrolytic	13.65	12.75	13.25
Casting	13.50	12.75	13.15
TIN	31.60	30.45	30.90
LEAD	4.45	4.35	4.40
SPELTER	6.45	6.25	6.30
ANTIMONY (Hallett's)	8.15	8.12½	8.15
SILVER	.51¼	.50¼	50.70

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Metal Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 61 Beekman street, New York.

Trade Wants on Advertising Pages 38 to 40 Following

Metal Prices, December 10, 1909.

NEW METALS.

	Price per lb. Cents.
COPPER—PIG, BAR AND INGOT AND OLD COPPER. Duty Free, Manufactured 2½c. per lb.	
Lake, car load lots	13.50
Electrolytic, car load lots	13.25
Casting, car load lots	13.25
TIN—Duty Free.	
Straits of Malacca, car load lots	31.60
LEAD—Duty Pigs, Bars and Old, 2½c. per lb.; pipe and sheets, 2¾c. per lb.	
Pig lead, car load lots	4.45
SPELTER—Duty 1¾c. per lb. Sheets, 1⅝c. per lb.	
Western car load lots	6.45
ALUMINUM—Duty Crude, 7c. per lb. Plates, sheets, bars and rods, 11c. per lb.	
Small lots	28.00
100 lb. lots	25.00
Ton lots	22.50
ANTIMONY—Duty 1½c. per lb.	
Cookson's, cask lots, nominal	8.35
Hallett's, cask lots	8.10
Other cask lots	7.50
NICKEL—Duty Ingot, 6c. per lb. Sheet, strips and wire 35% ad valorem.	
Shot, Plaquettes, Ingots, Blocks, according to quantity	.45 to .60
MANGANESE METAL—Duty 20%	.80
MAGNESIUM METAL—Duty 3 cents per pound and 25% ad valorem	$1.60
BISMUTH—Duty free	1.80
CADMIUM—Duty free	.75
	Price per oz.
GOLD—Duty free	$20.67
SILVER—Duty free	.51¼
PLATINUM—Duty free	29.50
QUICKSILVER—Duty 7c. per lb. Price per pound	72c. to 75c.

OLD METALS.

Dealers' Buying prices. Cents per lb.		Dealers' Selling prices. Cents per lb.
12.00 to 12.50	Heavy Cut Copper	13.00 to 13.25
12.00 to 12.25	Copper Wire	12.50 to 12.75
10.50 to 11.00	Light Copper	11.25 to 11.50
10.75 to 11.75	Heavy Mach. Comp.	12.00 to 12.50
8.75 to 9.00	Heavy Brass	9.25 to 9.50
6.50 to 7.00	Light Brass	7.25 to 7.50
7.75 to 10.00	No. 1 Yellow Brass Turnings	8.50 to 8.75
9.00 to 9.50	No. 1 Comp. Turnings	10.00 to 10.50
4.00 to 4.10	Heavy Lead	4.25 to 4.30
4.50 to 4.75	Zinc Scrap	5.00 to 5.25
5.00 to 6.00	Scrap Aluminum, turnings	5.00 to 6.75
10.00 to 12.00	Scrap Aluminum, cast, alloyed	11.00 to 13.00
14.00 to 15.00	Scrap Aluminum, sheet (new)	16.00 to 18.00
19.50 to 20.00	No. 1. Pewter	—— to ——
20.00 to 25.00	Old Nickel	20.00 to 25.00

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10% to 20%....according to quantity	28 to 35
Silicon Copper, 30%, guaranteed " "	38
Phosphor Copper, 5% " "	19 to 21
Phosphor Copper, 10% to 15%, guaranteed " "	28 to 30
Manganese Copper, 30% " "	30 to 35
Phosphor Tin " "	34 to 36
Brass Ingot, Yellow " "	9 to 10
Brass Ingot, Red " "	12 to 13
Bronze Ingot " "	11 to 12
Manganese Bronze " "	17 to 19
Phosphor Bronze " "	13 to 16
Casting Aluminum Alloys " "	29 to 35
PHOSPHORUS—Duty 18c. per lb. According to quantity	30 to 35

PRICES OF SHEET COPPER.

BASE PRICE, 18 Cents per Lb. Net.

PRICES MENTIONED BELOW ARE FOR QUANTITIES OF 100 LBS. AND OVER.

SIZE OF SHEETS.		64 oz. and over 50 lb. sheet 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60.	24 oz. to 32 oz. 18¾ to 25 lb. sheet 30 x 60.	16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60.	14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60.	12 oz. and 13 oz. 9½ to 11 lb. sheet 30 x 60.	10 oz. and 11 oz. 7¾ to 9½ lb. sheet 30 x 60.	8 oz. and 9 oz. 6¼ to 7¾ lb. sheet 30 x 60.	Lighter than 8 oz.
		Cents Per Pound Over Base Price for Soft Copper.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1	2	3	6	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	3	6	9	
	Longer than 96 inches.	"	"	"	"	2	6			
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches	"	"	"	"	2	4	7	10	
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	2	6	9		
	Longer than 96 inches. Not longer than 120 inches.	"	"	"	1	3				
	Longer than 120 inches.	"	"	1	2					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	"	1	2	4	7	10		
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	5	8			
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	8				
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	6	11			
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	9				
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins.	Not longer than 132 inches.	4	6							
	Longer than 132 inches.	5	8							

The longest dimension in any sheet shall be considered as its length.

CIRCLES, SEGMENTS AND PATTERN SHEETS, advance over prices of Sheet Copper required to cut them from. 3 cents per pound.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot, and heavier, add 1 " " "

COLD OR HARD ROLLED COPPER, lighter than 14 oz., per square foot, add 2 " " "

POLISHED COPPER, 20 INCHES WIDE and under, advance over price for Cold Rolled Copper of corresponding dimensions and thickness 1 " " sq. ft.

POLISHED COPPER, WIDER THAN 20 INCHES, advance over price for Cold Rolled Copper of corresponding dimensions and thickness 2 " " " "

COLD ROLLED COPPER, PREPARED SUITABLE FOR POLISHING, same as Polished Copper of corresponding dimensions and thickness.

COLD ROLLED AND ANNEALED COPPER SHEETS OR CIRCLES, same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

ROUND COPPER ROD, ¾ inch diameter or over.....Base Price.

(Rectangular, Square and Irregular Shapes, Copper Rod, Special Prices.)

ZINC—Duty, sheet, 1¾c. per lb.	Cents per lb.
Carload lots, standard sizes and gauges, at mill	8.00 less 8%
Casks	8.50
Open casks	9.00

Metal Prices, December 10, 1909

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect November 22, 1909, and until further notice.

To customers who purchase less than 40,000 lbs. per year and over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.14¼	$0.15¾	$0.17¾
Wire	.14¼	.16½	.18
Rod	.14¼	.16½	.19
Brazed tubing	.19⅝	—	.21½
Open seam tubing	.17⅝	—	.19½
Angles and channels, plain	.17⅝	—	.19½

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass...	½c.	per lb. net advance
" —Best spring, drawing and spinning brass....	1½c.	" " " "
Wire—Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

To customers who purchase less than 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.15¼	$0.16⅝	$0.18⅝
Wire	.15¼	.17½	.19
Rod	.15¼	.17½	.20
Brazed tubing	.20⅝	—	.22½
Open seam tubing	.18⅝	—	.20½
Angles and channels, plain	.18⅝	—	.20½

5% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass...	½c.	per lb. net advance.
" —Best spring, drawing and spinning brass....	1½c.	" " " "
Wire—Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

BARE COPPER WIRE—CARLOAD LOTS.

15.25 per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	18½c. per lb. base.
100 lbs. to 300 lbs. in one order	19c. " " "
Less than 100 lbs. in one order	20½c. " " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ in O. D. Nos. 4 to 13 Stubs' Gauge, 18c. per lb.
Seamless Copper Tubing, 22c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	26	25	20	19	18	18	18	18	18	18	18	19	20	22	24	25

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1⅛ inch	22	24
1¼ inch	25	27
1⅜ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 45 and 5%.

PRICES FOR MUNTZ METAL AND TOBIN BRONZE.

Muntz or Yellow Metal Sheathing (14" x 48")	14c.	lb. net base
" " " Rectangular sheets other than Sheathing	16c.	" " "
" " " Rod	15c.	" " "
Tobin Bronze Rod	16c.	" " "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bars in the rough 23¼c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 23 B. S. Gauge, 4c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 5c. above price of pig tin.

PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

	Wider than..... and including..... in coils.	3in. 12in.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.
No.	13 and heavier	33	33	35	35	35	35	38	38	38
"	14	33	33	35	35	35	35	38	38	38
"	15	33	33	35	35	35	35	38	38	38
"	16	33	33	35	35	35	35	38	38	38
"	17	33	33	35	35	35	35	38	38	38
"	18	33	33	35	35	35	35	38	38	41
"	19	33	33	35	35	35	35	38	39	42
"	20	33	35	35	35	35	37	40	41	43
"	21	33	37	37	37	37	39	42	43	49
"	22	33	37	37	37	39	39	42	46	50
"	23	33	37	37	37	39	39	42	48	51
"	24	35	37	39	41	41	41	44	50	53
"	25	35	38	40	42	42	42	45	52	56
"	26	35	38	41	45	45	45	50	54	60
"	27	35	39	43	47	47	48	53	57	63
"	28	35	39	45	47	48	48	55	61	66
"	29	37	40	47	49	51	51	60	66	71
"	30	37	41	49	51	55	61	68	71	76
"	31	42	46	54	57	62	70	73	76	82
"	32	44	48	56	60	68	76	90	89	94
"	33	46	50	59	64	72	83	90	90	100
"	34	49	54	61	69	77	90	102	109	119
"	35	..	64	69	79	89	90	114	124	..
"	36	..	79	89	90	114	119	134	..	..
"	37	..	103	113	128	143	159	173	..	..
"	38	..	123	133	153	168	183	203	..	..
"	39	..	143	163	183	203	223	..	..	..
"	40	..	173	203	223	243	..	..	..	..

In flat rolled sheets the above prices refer to lengths between 2 and 3 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are 100 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 25 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	26	23	..	..	13	11	9	8	15	22
12.	.109.	..	..	..	..	..	..	25	..	..	..	14	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	16	..	..	..	..	..
16.	.065.	..	..	..	..	..	27	26	26	23	22	20	20	20	20	26	30	50
18.	.049.	..	..	..	..	32	29	28	27	24	25	25	25	..	..	..	..	..
20.	.035.116	..	45	38	33	32	31	29	28	29	29	29	30	37	48	57	80
21.	.032.	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.187	97	47	41	37	36	34	33	..	..	44	..	..	..	..	..	..	..
24.	.022.187	132	107	87	78	72	61	59	65	..	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge.	000 to No. No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb....	31	31⅓	31½	32	32½	33	33½	34	35	36	37	42	45

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4	per cent.	to No.	19, B. & S. Gauge, inclusive		$0.60
6	"	"	19, " " "		.70
9	"	"	19, " " "		.85
12	"	"	19, " " "		1.00
15	"	"	19 " " "		1.15
16	"	"	19, " " "		1.20
18	"	"	19, " " "		1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICE OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quality and market conditions. No fixed quotations can be given as prices range from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .900 fine are quoted at 2c. to 3c. above the price of bullion.

INDEX NUMBER

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THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD. THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW AND COPPER AND BRASS

$1.00 Per Year 61 BEEKMAN STREET, NEW YORK 10 Cents Per Copy

A TRADE JOURNAL RELATING TO BRASS, COPPER, TIN, LEAD, ZINC, ALUMINUM, NICKEL SILVER, GOLD, BRONZE

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